Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada.....$6.00 a year
Foreign Edition, London.....£1 12*s* ($8.00) a year
Single Copies.....15 cents each

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLV., No. 21. FRIDAY, OCTOBER 23, 1908.

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The New Haven's overhead contact line construction, which was designed particularly for rigidity, has given considerable trouble because it was too successful in this respect. It is the double catenary suspension system, two upper steel messenger wires being connected to the lower copper wire, with which the sliding bow comes in contact, by triangular trolley hangers spaced 10 ft. apart. The sliding bow strikes these points of support a heavy blow, and the triangles are so stiff that breakages result, as well as excessive vibration throughout the structure and a great deal of sparking. To remedy this, another wire has been strung an inch or two below the old contact wire, being hung from it at points half way between the triangles. The sliding bow touches this wire only, and the blows at its points of support are cushioned in transmission to the rest of the structure, instead of striking directly the stiff triangles. This has proved so successful that the overhead construction has now been modified in this way over most of the tracks between Wakefield Junction and Stamford.

The Railway Signal Association with a membership now over eleven hundred, and with 43 roads represented in the membership officially, is gradually becoming a strong organization. By the amendments to the constitution, adopted at Washington last week its dignity and usefulness will be increased. The amendment reducing the number of meetings to three in each year will promote efficiency by preventing much waste of energy. It ought to have been adopted long ago. The meetings which are cut out have not been without benefit, but they ought to be wholly informal. That the specifications for different kinds of signal work, which have been adopted are important, is evidenced by the pronounced demand for them, which continues in spite of admitted deficiencies in most of the codes. The harmonizing of the different codes, which will probably be done this coming year, will no doubt greatly improve all of them. The action of the association in defining signal aspects and simplifying the code of aspects seems destined to greatly improve practice throughout the country, albeit there is a great wall of conservatism yet to be broken through. Hitherto most of the association's good work has been in connection with construction rather than design, with details rather than broad policy; but now it has opportunity to fill a larger and more important field. Under President Rudd it has made a good beginning toward taking a position of influence with managing officers; and this progress, we may confidently assume, will be kept up. The signal engineers of the country should not only tell their employers how to make and manage their signals, but also should have a more influential voice as to what to adopt, and how fast to turn the wheels of progress.

"Comparison with the previous year is impossible on account of the new forms prescribed by the Interstate Commerce Commission." This phrase has occurred again and again in our reviews of the annual reports of railroads for the fiscal year ended June 30, 1908, and must almost inevitably appear in any review of annual reports covering this period. Almost as inevitable is the phrase in the president's report: "Notwithstanding rigid economies in all possible directions, your company was forced to spend very much larger sums than usual for the preparation of statistics required by the Interstate Commerce Commission and for the rearrangement of accounts to correspond to the new forms prescribed by the Interstate Commerce Commission." Like the time-honored tariff question, it is doubtful whether a radical change even for the better can, for some time at least, be so much better in itself as to offset the very real disadvantages of a change. Is it pertinent to suggest that a change based on theory rather than on practical utility foreshadows another change which will double the harm of the first change? The experience of a generation or two of practical and successful railroad men probably has not been wholly thrown away in the making of annual reports.

The good to be derived by railroads from co-operative action through a central bureau is again illustrated in the general adoption of the uniform demurrage rules recommended by the American Railway Association. The harm done by the excessive and sometimes discriminating privileges given by the widely varying rules formerly in effect was keenly felt by the railroads during the car shortage in 1906-1907, and the National Association of Car Service Managers, at a meeting in Cincinnati, in May, 1907, framed a new code of uniform rules for submission to the American Railway Association. While the principles of this code of rules were correct, it was not well arranged, and the A. R. A. Car Service Committee, at a meeting in Atlantic City, N. J., in September, 1907, recommended a code having substantially the same provisions but somewhat differently arranged, that was adopted the next month as the American Railway Association's recommended practice. To W. Heyward Drayton, of the American Railway Clearing House, Chicago, belongs the credit for framing these rules. The Clearing House also deserves credit for constantly urging upon railroad officers the need for adopting them, until they have been put in effect by a large majority of the demurrage associations. It is probable that in a short time they will be in effect throughout the country. Only one change has been made in the rules originally recommended

by the Car Service Committee, and this was made to comply with the ruling of the Interstate Commerce Commission (I C C No. 933), regarding demurrage on private cars, as recently announced. The reductions that have been made, through the adoption of uniform rules, in the free time allowed shippers for loading, unloading and reconsigning, will result in a saving of hundred and thousands of car-days and will benefit shippers and consigners no less than railroads, as soon as the demands of traffic again equal the available supply of cars.

AMERICAN STREET & INTERURBAN RAILWAY CONVENTION.

It is not sufficient to merely record the 1908 convention of the American Street & Interurban Railway Association and its affiliated associations as the most successful in the history of the organization. It is necessary to make special mention of those more tangible results, which collectively form a criterion of what has been accomplished and which give indication of what still remains to be attained in time to come. An evidence of substantial and earnest intent on the part of the delegates is shown by the fact that the deliberative sessions, both general and executive, of the several associations were better attended than ever before. The committee reports covered a wide range of subjects and although these reports might have been of greater value had there been a more general co-operation on the part of the member companies, they were excellent, and form a valuable addition to the records of experience and investigation. It is to be regretted that the committees so generally reported an apparent lack of interest on the part of many who were asked to return data sheets about the technical conditions existing on their lines. The good of the entire association rests heavily on general and enthusiastic co-operation in preparing committee reports, which must finally be recognized as the vital feature of the convention. Special mention should also be made of the program arrangements by which it was possible for a delegate to attend the various meetings. For instance, it was possible for the general managers to attend all the sessions of both the American and the Transportation & Traffic Associations and when the American Association was not in session it was possible for these same delegates to attend the meeting of either the Transportation & Traffic or the Accountant's Associations. With the four meeting places of the five associations there seemed little if any cause for a delegate not attending any desired session.

It is also interesting to note the general approval of Atlantic City as a meeting place for the convention. While there may at times appear reasons justifying the holding of conventions in different parts of the country, at the same time Atlantic City probably makes the nearest approach to the ideal convention city. There seems to be no other place which fulfills the requirements for hotel accommodations, meeting places, amusements and exhibit space as well, and it has been suggested that this may lead to the establishment of a permanent convention home.

This involves the construction, or purchase, by a combination of many or all of the engineering associations and societies of the country, of a permanent pier with the necessary meeting halls and exhibit space. Permanent apparatus for testing and general research work might be located on this pier, which would eventually come to be the general laboratory of the associations.

The exhibit feature of the street railway conventions has made great progress within the last few years and was most creditable at the convention just closed. It would have graced a convention of a month's duration instead of only five days. A spirit of enterprise on the part of the Manufacturers' Association was most evident and every assistance should be forthcoming from the members of the American Street & Interurban Railway Association and its affiliated associations for a continuance of an increasingly important display of devices gotten up for the benefit of the street railway officers. The exhibits of the present day conventions are probably as important as any other feature. General managers of street railways might profitably see to it that these conventions are more generally attended by their subordinates who are to be the managers of the future. There is no better way of keeping in touch with the most recent development in street and interurban railway equipment than in attending these conventions.

UNION PASSENGER STATION SITUATION AT KANSAS CITY.

For more than two years negotiations have been pending between the railroads entering Kansas City, Mo., and the council of that city about the construction of new terminals and a new union passenger station there. The people and press of the city agitated for a new station for some years before the railroads finally found conditions ripe for them to act. Since the roads decided to act many things have happened to delay the carrying out of their plans. It is believed that the negotiations are now nearing a successful issue.

The first step was taken in the spring of 1906, when the Kansas City Terminal Railroad Company was organized with an authorized capital of $50,000,000. Ten roads are in the company, each owning one-tenth of the stock. They are the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Wabash, the Missouri Pacific, the Union Pacific, the Chicago, Milwaukee & St. Paul, the St. Louis & San Francisco, the Chicago, Burlington & Quincy, the Chicago & Alton and the Missouri, Kansas & Texas. All these roads intend to use the new station. The Kansas City Southern also has been invited to use it, and the Chicago Great Western has asked for admission. H. L. Harmon, formerly General Southwestern Agent of the Chicago, Burlington & Quincy, with headquarters at Kansas City, and later President of the Inter-City Viaduct Company of Kansas City, is President of the Terminal Company. Mr. Harmon on October 6, last, was elected President also of the Kansas City Union Depot Company, which owns the present union passenger station, and on October 13 last was elected President of The Kansas City Belt Railway Company. Thus the affairs of the old and the new companies have been brought under one management.

In June, 1906, the Terminal Company presented to the Kansas City council its plans in the form of an ordinance. It was proposed to build a station and terminals to cost not in excess of $29,000,000. The station was to be at Twenty-second street and Grand avenue, and the terminal tracks were to occupy the right-of-way of the Kansas City Belt Railway.

The Belt Railway has a double-track line which starts in the extreme eastern part of the city, and runs westward to the Missouri-Kansas state line, which it crosses at Twenty-fourth street. It crosses 42 streets. Thirty of these are now protected by depresed or overhead crossings. The Belt Railway is used for both freight and passenger business by the Santa Fe, the St. Paul and the Rock Island.

The plan proposed by the railroads contemplated the elimination of all existing grade crossings on the Belt Railway by the closing of some unimportant streets, and the elevation or depression of the rest of the streets that are unprotected. It also contemplated the complete segregation of freight and passenger business. Four additional tracks were to be built on the Belt Railway right-of-way, making six tracks there. These were to be used exclusively for passenger business. Four more tracks were to be built along the north side of the city, parallel to the tracks of the Chicago & Alton, and to these were to be diverted the freight traffic now handled by the Belt line. Four tracks were also to be built from the "Gooseneck" around the West Bluff to a connection with the Belt Railway at Twenty-fifth street to afford the Chicago, Burlington & Quincy an entrance to the new passenger terminals; and a high line approach was to be constructed across the Kaw river from Kansas City, Kans., to accommodate the Union Pacific, the Rock Island, and the Missouri Pacific.

Negotiations between representatives of the railroads and Mayor Henry M. Beardsley and a joint committee of the Kansas City council began in October, 1906. Several points of difference soon arose. For example, representatives of the city suggested that there ought to be in the ordinance a provision that trains on the terminals should be operated only by electricity. It was pointed out to them that this would require a heavy expenditure while the hauling of heavy trains by electrical power was still in an experimental stage, and that the change from electric to steam and from steam to electric locomotives outside the city every time a train came in or went out would cause much delay. This suggestion as to electrification, therefore, was soon dropped. The negotiations went on without interruption until March, 1907. It was supposed then that agreement had been reached on all points.

The ordinance, as drawn up at this time, contained the provisions already mentioned, and specified that the new passenger station should cost over $2,000,000. It also provided for the purchase by the Terminal Company, and the dedication to the city, of about four blocks of ground in front of the station as a public park. This ground has been bought at a cost of $250,000.

But some new questions were now raised that have been bones of contention ever since. One of these questions pertained to switching charges. At present charges for switching freight at Kansas City are absorbed by all the roads on traffic from and to all competitive points. The city proposed to put into the franchise a contract binding the Terminal Company and all the ten roads that own it to absorb switching charges perpetually. Those who made this proposal said that the Terminal Company would in all probability in due time take over all the freight terminals in Kansas City. A "switching monopoly" would result that probably would stop the absorption of switching charges to the injury of shippers. A further controversy arose over the matter of payment of damages to land. The city wished to bind the Terminal Company to pay all damages caused by the building of viaducts and other improvements. The Terminal Company was unwilling to assume an unknown and unascertainable liability.

In January, 1908, the financial panic and business depression caused the board of directors of the Terminal Company greatly to curtail the plans. The directors told the officers of the company not to expend over $15,000,000. All plans were revised and estimates were sharply cut.

Negotiations with the city have continued throughout the present year. Since last April the city has been represented by a new mayor, who was elected at that time, T. T. Crittenden. The representatives of the railroads have proposed to put in the franchise an anti-merger clause, to provide that the Terminal Company shall never, either directly or indirectly, get control of the independent freight terminals of the various roads. Shippers handling five-sevenths (250,000 out of 350,000 cars) of the carload freight handled in the city annually have petitioned Mayor Crittenden to accept this proposition. This does not include the Kansas City Stock Yards Company, located in Kansas City, Kan., which handles about 100,000 carloads annually. It seems probable that this is the basis on which the question of switching charges will be settled.

Regarding land damages, the Terminal Company has offered to unite with the city in appointing a disinterested committee of experts to study the situation and estimate the probable actual damages. The Terminal Company will then pay into the city treasury the amount of the estimated damages, if the city will assume the obligation of satisfying property owners.

For the land already bought by the Terminal Company for the new terminals, $3,000,000 has been paid. It is expected that about $2,000,000 more will be spent for land. These expenditures are for land for the site of the passenger station, for the park to be given to the city, for the widening of the present right-of-way of the Belt Railway, and for the right-of-way for the new freight terminals on the north side of the city. The original plans for the new station and terminals were drawn by Jarvis Hunt, of Chicago. Mr. Hunt is now engaged in modifying the plans to meet the reduction ordered in contemplated expenditures.

The existing passenger station and terminals at Kansas City are very inadequate. While the pending negotiations have progressed slowly, they usually have been carried on with good temper and fairness on both sides. It is to be hoped that nothing further will happen to delay their consummation, and that work will soon begin on a station and terminals commensurate with both the present and the probable future greatness as a railroad center of the pushing young metropolis of the southwest.

TRANSCONTINENTAL RAILROADS AND TRANS-PACIFIC TRAFFIC

The so-called transcontinental railroads of the United States have filed with the Interstate Commerce Commission tariffs effective on November 1, that apply their domestic rates to the Pacific coast as their proportions of the through rates on business moving from this country to the Orient. This will make the through rates via the transcontinental railroads and Pacific steamship lines so high that little or no business will move that way. The Toyo Kisen Kaisha and the Nippon Yusen Kaisha, the two Japanese steamship lines that ply between San Francisco and Seattle and Asiatic ports, are so highly subsidized by the Japanese government that they, perhaps, can make low enough rates, in connection with the rates to be applied by the transcontinental railroads, to handle some Oriental business in competition with vessels from New York using the Suez route; and we are informed that the transcontinental roads will interchange business with the Japanese steamship lines upon precisely the same terms as they have in the past with all lines having regular sailings from Pacific ports. But the unsubsidized American steamships that have worked with the transcontinental roads will probably be driven out of business.

The Canadian Pacific has decided to publish divisions of the through rates to the Orient that its representatives say will be 70 to 75 per cent. of its domestic rates to the Pacific coast; and the Chicago, Milwaukee & St. Paul will make rates concurring with it on business moving from the United States. The St. Paul, fast pushing its Pacific coast extension toward completion, soon will be a strong competitor of the existing transcontinental lines. Its action in concurring with the Canadian Pacific now must mean that when it becomes a transcontinental road it will publish divisions of rates on Oriental business lower than its coast terminal rates. Whether the older transcontinental lines will then meet its competition will be settled then. They have no intention now of changing the policy indicated by their tariffs.

The action of the transcontinental roads in "going out" of trans-Pacific export business is the result and culmination of a long controversy between their officers and the Interstate Commerce Commission over the regulation of the rates of these roads on export business. It is an interesting and unexpected result of the administration of the Hepburn act.

Domestic railroad rates to the Pacific coast from the eastern part of the United States have long been quite low, being controlled by water competition around South America. Rates to the Orient via the transcontinental railroads and the Pacific ocean must meet approximately the rates made by vessels plying through the Suez canal between New York and the Orient. In consequence, the transcontinental lines' proportions of the rates to the Orient have been a great deal lower than the already low domestic rates to the Pacific coast terminals. Prior to the passage of the Hepburn act the through rates on Oriental traffic were often even less than the domestic rates to the coast. These very low rates on foreign business were enabling the transcontinental roads and the American steamship lines on the Pacific that were operated in connection

with them to get a large and growing share of the business moving between points east of Chicago and the Orient. But after its reorganization under the Hepburn act, the Interstate Commerce Commission intimated to the carriers that it did not think that they ought to make lower through rates on foreign commerce than they made on domestic shipments. The transcontinental roads, in consequence, late in 1906 made their rates to the Pacific coast from points of origin their minimum through rates to the Orient. The commission also held that the 30 days' notice required by the Hepburn act must be given by participating railroads as to changes in through rates to foreign ports.

The business passing through the Pacific coast ports declined from that time. This was largely due to the termination of the Russo-Japanese war, which caused a fall in the total exports from this country to the Orient; but it is claimed that it was also largely due to the attitude of the commission.

The major part of the commodities that are shipped from the United States to Asia originate in the territory between Chicago and New York. Pittsburgh is the mean point in this territory. The short line mileage from Pittsburgh to New York is 445 miles, and from Pittsburgh to Chicago is 468 miles. Therefore, the rate from Chicago via the Pacific coast ports must approximate to the rate from New York via the Suez route, allowance being made for differences in conditions of transportation, if a fair proportion of the business is to be moved through the Pacific coast ports. As a matter of fact, the rates via the Pacific coast ports after the readjustment to meet the views of the commission were, and still are, disproportionately higher than the rates via the Suez route. The rate on raw cotton from St. Louis via Seattle was 81 cents; from New York 40 cents. On cars, K.D., from Chicago via Seattle it was $1.50; from New York, 70 cents. On print paper from the interior via Seattle it was 75 cents; from New York, 47 cents. On plain wire from New York the rate was 25 cents; from Denver via Seattle, 50 cents, and from Pittsburgh via Seattle, 77 cents. The following are some of the nominal rates from New York via the Suez route and the rates from New York via Seattle:

	Via Suez Canal.	*Via Seattle.*
Carbon black	$1.22	$1.50
Cotton piece goods	.62½ and $ .70	1.25
Drugs	.70	3.00
Iron and steel, structural	.27	.75 and $1.25
Machinery	.70	1.40
Wood pulp	.52	.75
Rails and fastenings	.22	.22½
Leaf tobacco	1.05	1.50 and 1.75

This disparity in rates alone would have made it very hard for the transcontinental roads and the Pacific steamships to compete against the Suez route. The requirement of 30 days' notice of changes in rates made their case still worse. This requirement did not bind the ocean steamship lines. They might change their rates as often as they liked. And, in fact, their rates were and are constantly fluctuating, being raised or lowered according to the amount of traffic in sight. Now, if rates were suddenly lowered by a ship on berth at New York, shippers at Chicago or at any place east of Chicago might profit by the reduction. The short line rail haul from Chicago to New York is 913 miles. From Pittsburgh it is 445 miles. The rail carriers could give 30 days' notice of the reduction in the through rates, and the goods could be got to New York before the vessel making the special rate had left. Suppose, on the other hand, that a ship at San Francisco, finding the business offered insufficient, made a sudden reduction to get a bigger load. The short line distance from Chicago to San Francisco, the nearest Pacific port, is 2,279 miles. From Pittsburgh, via Chicago, it is 2,747 miles. Before freight could be hauled such great distances, after the 30 days' notice of the new through rate, the ship making the special rate probably would be gone.

Complete data as to the decline in trans-Pacific business after the Hepburn act went into effect is not available. The export tonnage handled by the Great Northern and the Northern Pacific in 1905 was 299,884 tons as compared with 54,211 tons in 1902. Their export tonnage in 1906 was 89,590; in 1907, 61,411. The decline from 1905 to 1907 was 80 per cent. This is said to be typical of what happened on all lines. Meantime the total exports from the United States to China and Japan declined in value from $105,173,068 to $64,474,559, or 38 per cent., and the exports to Asiatic Russia increased in value from $333,454 to $2,004,199. The decline of the export business handled by the transcontinental carriers was much greater proportionately than the total decline in exports to the Orient, showing that their business was suffering from special causes. The trans-Pacific lines concluded that they could not compete with the Suez route without making lower rates and getting released from the requirement of 30 days' notice.

This was substantially the status of the matter when the Interstate Commerce Commission on February 3, 1908, issued its revised Tariff Circular 15-A, effective on April 15, in which it required the carriers not only to give 30 days' notice of changes of rates, but to publish and post the inland import and export rates separately; to make these rates the same for all, regardless of what ocean carrier may be designated by the shipper; and where through billing was used to clearly separate the liability of the inland carrier from that of the ocean carrier and to show on the bill of lading the tariff rate of the inland carrier.

The transcontinental lines protested against these requirements. On June 8, 1908, the commission made a ruling authorizing advances in export rates upon 10 days' notice and reductions upon 3 days' notice, but refusing to withdraw or modify the other requirements. Soon afterward the transcontinental lines announced that after November 1 they would apply their domestic rates to the Pacific coast as their proportions of the through export rates.

One of the requirements of the commission that the transcontinental lines protest against is that they must make the same rates for all regardless of what ocean carrier may be designated by the shipper. This means that if the shipper designate a tramp steamer, the roads must turn the traffic over to it. Heretofore the transcontinental lines have interchanged trans-Pacific traffic almost exclusively with steamship lines with which they had contracts or arrangements for regular service. Through rates have been made and through bills of lading issued from the points of origin in this country to destinations in the Orient. Only when enough space has not been available on steamers of the regular lines has traffic been interchanged with steamship lines with which the roads have not had contracts. These contracts were not made merely with steamship lines under the same ownership as the railroads, but were made with all ocean lines giving regular service. This was the policy of the roads because they wished regular sailings. When ships come and go on a fixed schedule there is a minimum of delay to railroad equipment. It is possible to know how large warehouse, dockage and terminal facilities will be needed, and the amount of these facilities required will be smaller than when service is irregular. Steamship companies under contract may not leave relatively unprofitable overland freight, as a tramp ship may, because there is a chance to get better paying cargo of local traffic. Since shippers can get a guaranteed through service from New York via the Suez canal, many would not ship via the Pacific unless the railroads guaranteed the through service. Now, no steamship company would establish lines with regular sailings with the knowledge that its earnings were to be exposed to frequent and serious depletion by the irregular comings and goings of tramp vessels. The steamship lines would give sailings regularly only if they knew that they were to be given business regularly. The transcontinental roads protest against the ruling of the commission because it tends to make it difficult or impossible to maintain regular through service to the Orient; and without such service the trans-Pacific route cannot compete successfully with the Suez route.

But the requirement of the commission which the roads protest most strongly against is that they must publish, post

and state in their bills of lading the inland portion of the through rate. The reasons for this ruling of the commission were indicated by Commissioner Lane in the opinion rendered by him in the case of Cosmopolitan Shipping Company *v.* Hamburg-American Packet Company *et al.* In that case the commission held that it had no jurisdiction over any part of commerce with non-adjacent foreign countries except over the movement of traffic between inland points and the ports of the United States. Since the only part of a through rate to or from a non-adjacent foreign country that is subject to regulation by the commission is the inland portion, the commission insists that the inland portions of export and import rates must be published and posted in order that they may be subjected to scrutiny and control.

The through rates of the transcontinental roads and the steamship lines with which they have interchanged traffic have always been on the percentage basis of divisions. Blanket rates are made from all points east of the Missouri river to the Orient. Whatever these rates may be, the railroad gets a certain percentage of the amount and the steamship a certain percentage. When rates have been changed to meet competition via the Suez route, the amounts received by the railroad and the steamship have both changed, but the percentages of the total amount received by each have remained unchanged. As the bases of division have not been made public, shippers have known what through rates they had to pay, but have not known what the railroads got out of the through rates.

Since Pacific coast domestic rates are now minima for the through rates, the railroads' proportions of the through rates are, of course, a good deal less than their domestic rates. They are, roughly, from 40 per cent. to 75 per cent. of the domestic rates to the coast. The export business has been only a small part of the entire business handled by the transcontinental lines. It is roughly estimated by the best authorities at 5 per cent. of their total traffic in tonnage and less than 5 per cent. of their total traffic in value. The revenue that they have got out of it has been relatively very small. The preponderance of traffic of the transcontinental lines is eastbound. Their officers reasoned that to get lading for cars that otherwise would move westward empty they could afford to make very low rates; that shippers who sent export traffic over a railroad on low rates would be apt also to send domestic traffic over the same line at higher rates; and that a business that was not small and unprofitable might in time grow into one that was large and profitable. It is very doubtful if some of this export traffic has paid the roads for the direct expense of handling. It is doubtful if much of it has yielded any profit. For example, there cannot be much money in handling nails from Cleveland, Ohio, to China for 40 cents per 100 pounds, 10 cents of which goes to the steamship line.

The traffic officers of the railroads feared that if the inland proportions of their through rates were made public, and shippers learned how much lower tney were than the domestic rates on the same goods, they would at once begin petitioning the Interstate Commerce Commission to reduce the domestic rates upon the ground that they were unreasonable. They also thought they had good reason to fear the commission would lend a willing ear to such complaints. In the case of Merchants' Traffic Association *v.* New York, New Haven & Hartford *et al.* (I. C. C. No. 889) complaint was made that a rate of $1 per 100 pounds was made on cotton piece goods in car loads, and a rate of $1.50 in less than car loads, from New England points to the Pacific coast, while from New England points to Denver a rate of $1.79, L.C.L., was charged, and no car load rate was made. No order was issued in this case, but in the report Commissioner Prouty used these significant words:

"It has often been found by this commission and must be recognized in all cases that water competition determines the rail rates between the Atlantic seaboard and the Pacific coast; but it must be assumed that the rates made by carriers to meet this competition are remunerative; and if $1.50 pays carriers anything for transporting a commodity from New York and San Francisco, we think $1.50 from New York to Denver yields a sufficient profit. Certainly if carriers can transport a commodity for $1, or even for 90 cents, the 3,400 miles from Boston to San Francisco, they ought not ordinarily to charge more than $1.50 for transporting the same commodity (2,000 miles) to Denver."

If the commission reasoned likewise as to the domestic rates of the transcontinental lines to the Pacific coast and the divisions heretofore accepted by them on trans-Pacific business, it would inevitably find their domestic rates excessive. To publish and keep in effect the present divisions of the export rates was, therefore, traffic officers of the railroads reasoned, to imperil their revenues from the 95 per cent. of their business that was profitable, in order to keep the 5 per cent. of their business that was of very doubtful profitableness. They decided that it would be better for them to go out of the trans-Pacific business entirely than to invite the dangerous attacks that they would invite by clinging to it. Since the commodities that they handle on import rates are altogether different from domestic commodities shipped eastward from the coast, there is not the same danger of their divisions of the import rates being contrasted to their injury with their domestic rates; and therefore they will publish a full line of through rates on import traffic. But the import traffic will feel the effects of the withdrawal of through export rates; for imports naturally tend to follow the same route as exports.

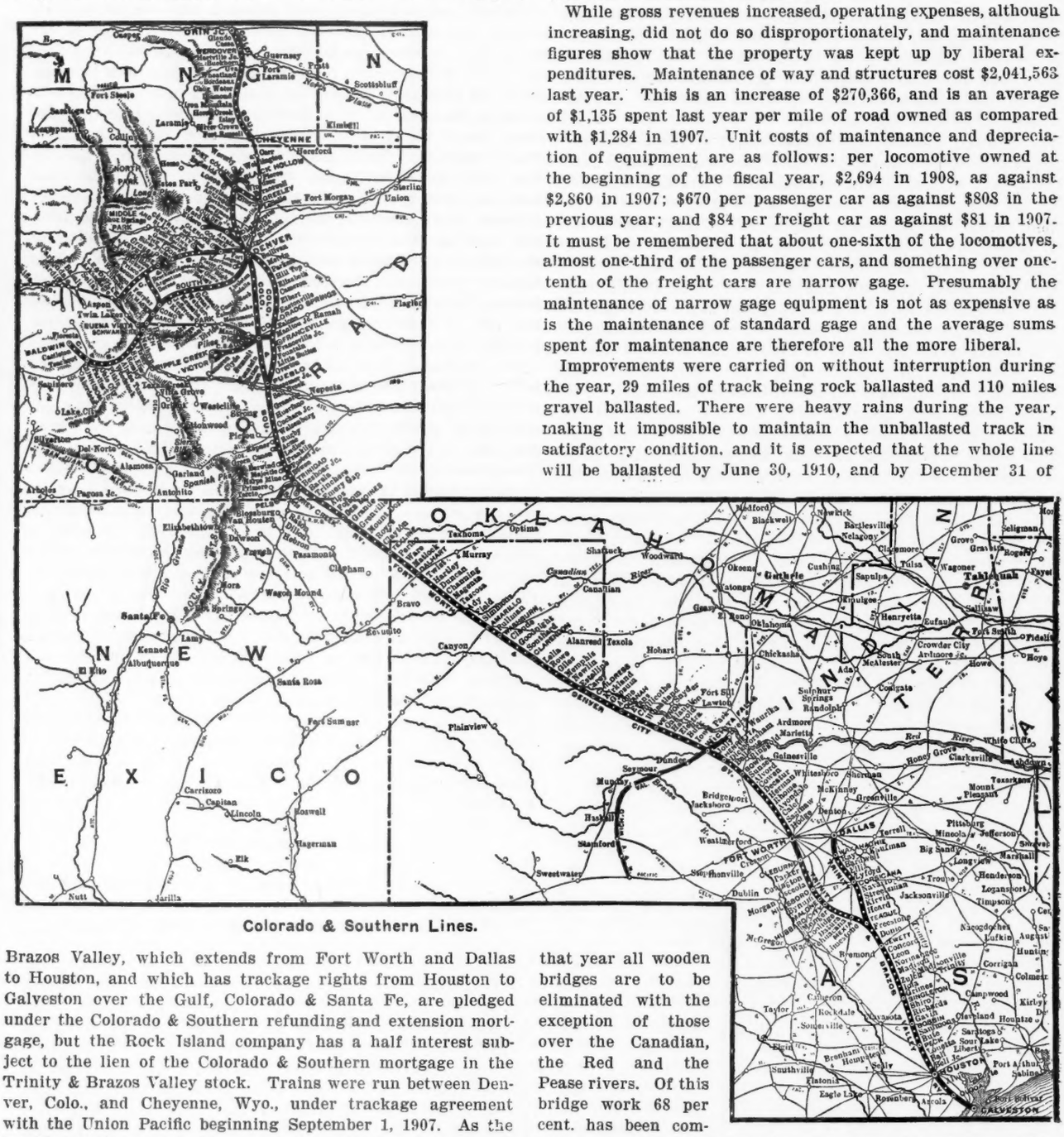
The steamship lines using the Suez route will gain by the action of the transcontinental roads. The roads themselves will lose little, because the business being abandoned has not paid them much. The American steamships that have been operated on the Pacific in connection with the railroads will be sold or put into other service. The Pacific coast will suffer from the loss of the commerce that will be diverted from its ports to ports on the Atlantic coast. Newspapers and business men on the Pacific coast have been denouncing the commission's interpretation of the law regarding the publication of rates as the cause of the action of the railroads. These denunciations are misdirected. The railroads would be perfectly willing to publish their divisions of the through export rates if they had not recently had much very costly experience with shippers and commissions that have attacked their rates and revenues regardless of every commercial and transportation condition that ought to be given weight in rate-making. Their action illustrates the growing disinclination of traffic men to make low rates to develop business from fear that their lowest rates will be taken by unintelligent or unfair shippers and commissions as bases to which all their charges ought to be reduced.

COLORADO & SOUTHERN.

To explain the somewhat unique showing made by the Colorado & Southern during the past year, in which the road earned $14,280,535 gross revenue, an increase of $906,731, or about 7 per cent., over the previous year, it is necessary first to make a study of the location of the road, as shown on the accompanying map, and then of the character of traffic hauled. The Colorado & Southern, with its owned and controlled lines, gives the traffic originating in Colorado and the southeast corner of Wyoming a direct outlet to the Gulf. In Colorado the numerous branches north and south and southeast of Denver tap the richest mining region in the state, and some of the most fertile agricultural land. The main line from Pueblo, Colo., south through a corner of New Mexico and through the state of Texas, runs through a rapidly developing new country which at present is largely given over to the cattle industry, but should become, especially along the line of the Trinity & Brazos Valley, a fertile agricultural country. It is a fact that, in the late winter and early spring, vegetables are shipped from Texas north into Colorado, and that late in summer the same kind of vegetables are shipped south from Colorado into Texas. It is largely this rapid development of the country in which it operates that accounts for

substantial gain in revenues during a year of generally decreasing railroad earnings. Before going into more detail as to the character of traffic carried by the road it is well to go back over the history of the company's acquisition of a line from Colorado and Wyoming to tide water.

The Colorado & Southern, which operates in Colorado and New Mexico, owns the stock of the Fort Worth & Denver City. All of the issued stock and bonds of the Trinity & Brazos Valley, which extends from Fort Worth and Dallas to Houston, and which has trackage rights from Houston to Galveston over the Gulf, Colorado & Santa Fe, are pledged under the Colorado & Southern refunding and extension mortgage, but the Rock Island company has a half interest subject to the lien of the Colorado & Southern mortgage in the Trinity & Brazos Valley stock. Trains were run between Denver, Colo., and Cheyenne, Wyo., under trackage agreement with the Union Pacific beginning September 1, 1907. As the president points out in his report, this adds 107 miles to the operated mileage, while an average of only 1½ freight trains per day were run over the line.



Colorado & Southern Lines.

The majority of the roads whose annual reports have so far been received for the fiscal year ended June 30, 1908, had marked decreases in gross earnings, especially during the second half of the year, the Colorado & Southern on the other hand carried 882,875,346 tons of revenue freight one mile, a decrease of less than 5 per cent., but received 1.134 cents per ton per mile as compared with 1.043 cents in the previous year, an increase of over 8 per cent. The number of passengers carried was 2,935,266 last year as compared with 2,801,699 in 1907, and the average rate received per passenger per mile was 2.53 cents last year as compared with 2.42 cents in the previous year. Thus, total freight revenue was $10,011,749 in 1908, an increase of $350,342, while passenger revenue was $3,549,196, an increase of $403,089.

While gross revenues increased, operating expenses, although increasing, did not do so disproportionately, and maintenance figures show that the property was kept up by liberal expenditures. Maintenance of way and structures cost $2,041,563 last year. This is an increase of $270,366, and is an average of $1,135 spent last year per mile of road owned as compared with $1,284 in 1907. Unit costs of maintenance and depreciation of equipment are as follows: per locomotive owned at the beginning of the fiscal year, $2,694 in 1908, as against $2,860 in 1907; $670 per passenger car as against $808 in the previous year; and $84 per freight car as against $81 in 1907. It must be remembered that about one-sixth of the locomotives, almost one-third of the passenger cars, and something over one-tenth of the freight cars are narrow gage. Presumably the maintenance of narrow gage equipment is not as expensive as is the maintenance of standard gage and the average sums spent for maintenance are therefore all the more liberal.

Improvements were carried on without interruption during the year, 29 miles of track being rock ballasted and 110 miles gravel ballasted. There were heavy rains during the year, making it impossible to maintain the unballasted track in satisfactory condition, and it is expected that the whole line will be ballasted by June 30, 1910, and by December 31 of that year all wooden bridges are to be eliminated with the exception of those over the Canadian, the Red and the Pease rivers. Of this bridge work 68 per cent. has been completed. Owing to the fact that 167 miles of line were relaid with heavier rails in 1907, there was only about three miles of track laid with new rails last year.

The character of freight tonnage carried is interesting, as has already been mentioned, from the light it throws on the gross earnings of the road in a year of general business depression. Last year the tonnage of products of mines was 62 per cent. of the total tonnage carried, and the revenue from this source was 43 per cent. of the total freight revenue.

Products of agriculture come next with 14 per cent. of gross tonnage and 18 per cent. of freight revenues. Colorado and Texas should both have a great agricultural future before them. Colorado especially is becoming more and more of a fruit growing state, and it is interesting to speculate as to the effect the completion of the Panama canal will have on traffic originating in Colorado and carried to the Gulf. The lands of Texas, which until recently were thought to be entirely unfit for agriculture, have been discovered to be particularly fertile under irrigation. Both in Colorado and in Texas crops of alfalfa for hay are easily raised on irrigated land and should be an extremely profitable shipment from Galveston to England and Europe via the Panama canal. Some idea of profits of alfalfa raising may be gained from the fact that in parts of Texas they cut five crops of this hay off the same acre of land each year. The Colorado & Southern last year carried 81,000 tons of hay, an increase over the previous year of 40 per cent. While the tonnage of products of mines decreased by about 300,000 tons last year, the products of agriculture increased slightly, and the tonnage of manufactures increased by about 4 per cent., being 548,039 tons last year. The tonnage of iron and steel rails originating on the Colorado & Southern lines was 70,351 tons last year as compared with 52,049 tons in the previous year. Of the total tonnage carried, 74 per cent. originated on the Colorado & Southern Lines. The way in which the country along the line of the railroad is being settled is shown by the increase in the number of passengers carried, which has already been mentioned, and this speaks well for the future prospect of an increase in freight traffic.

The balance sheet as of June 30, 1908, which, with the other exhibits in the report, is certified to by Deloitte, Plender, Griffiths & Co., shows but $509,040 cash on hand, and current assets of but $2,144,327, while there were bills payable of $2,500,000. Since the close of the fiscal year, however, there have been sold $300,000 first mortgage bonds and $3,000,000 refunding and extension bonds, and the bills payable have been met, so that now the company has no floating debt and probably quite a little more cash on hand than shown by the balance sheet of June 30. The treasury also has a good reserve of refunding and extension mortgage bonds. The balance sheet of June 30 showed $5,346,571 of these bonds in the hands of the treasurer. The Colorado & Southern has advanced for construction work $893,778 to other companies, for which it holds certificates of indebtedness.

During the year 4 per cent. was paid on the $8,500,000 first preferred stock and 4 per cent. of the $8,500,000 second preferred, and after these payments the company had a surplus equal to almost 6 per cent. on the $31,000,000 common stock. With every prospect of increased earning power and increased offering of traffic, the outlook from an operating point of view for the Colorado & Southern is particularly good. The refunding and extension mortgage bonds authorized to the amount of $100,000,000 should take care of the capital needs of the company for a long time.

The following table shows the results of operation during the last two years, the figures for 1907 having been rearranged to correspond with the form prescribed by the Interstate Commerce Commission:

	1908.	1907.
Average mileage operated ...	1,932	1,758
Freight revenue	$10,011,749	$9,661,407
Passenger revenue	3,549,196	3,146,107
Total operating revenue.....	14,280,535	13,373,804
Maint. way and structures.	2,041,563	2,311,930
Maint. of equipment	2,124,149	1,833,661
Traffic	276,795	254,986
Conducting transportation..	4,657,528	4,183,457
Total operating expenses.....	9,594,206	8,981,624
Taxes	407,101	335,195
Net operating revenues	4,279,228	4,056,984
Gross income	4,634,962	3,985,457
Net income	2,536,025	2,216,146
*Dividends	686,441	763,169
Surplus	1,839,584	1,452,977

*Includes $6,441 uncollectable accounts in 1908, and $253,169 uncollectable accounts and discount on bonds in 1907.

NEW PUBLICATIONS.

Intercorporate Relationships of Railways in the United States, as of June 30, 1906. Prepared by the Division of Statistics and Accounts, Interstate Commerce Commission, Washington, D. C.

This ponderous waste-of-time was described briefly in the *Railroad Gazette*, April 10, 1908. As was said at that time, when the text of the report appeared without the statistical part, the report covers investigations intended to show the manner in which railroad corporations have been welded into highly centralized systems, and to present a statement of net railroad capital outstanding in the hands of the public, eliminating all holdings of railroad securities by other railroad corporations. It shows, according to the commission's calculations, that the net railroad securities of the country were, in 1906, on a basis of $58,050 per mile of line. This figure is of considerable statistical interest, but hardly justifies the labor spent in deriving it, especially as it is now two years old. The worst of inquiries of this sort is that they require railroads to spend many thousands of dollars in clerical labor in order to answer, in a technical manner, the exceedingly complex questions propounded by the government for the sake of bringing out facts already a matter of common knowledge, or readily obtainable by less complex and bureaucratic methods.

Letters to the Editor.

THE "RUN LATE" ORDER ON SINGLE TRACK.

To the Editor of the Railroad Age Gazette:

According to press reports two serious collisions which occurred recently were due to errors made in the time of late orders. The late orders were issued in the proper form as prescribed by the standard code and were used legitimately, the errors being made by the men on the trains and the signalman handling the orders and in carrying out their provisions.

Not knowing the conditions under which these orders were issued, I do not wish to criticise in these particular cases; but on the general subject of the use of the late order on single track there is a word to be said.

Had a straight meet order been issued in the cases noted, the conditions which caused the collisions would not have existed. There may be cases where a late order is necessary on single track, but they are rare, and even where apparently necessary they can frequently be avoided. Where there are blind sidings between telegraph offices the direct meet order is preferable. The "A B C" rules provide for meeting trains at blind sidings, meeting points being fixed by exceptions noted on block cards, and according to statements made by Mr. Beamer this plan has proved its advantages in actual practice The results obtained by Mr. Beamer clearly demonstrate the value of a direct meet by train order where the standard code is used; he has shown that if his road were operated under the standard code there would be no necessity for the late order.

The utility of the late order is largely confined to double-track operations. On single track it is a constant source of trouble; while it does not confer a right by direction or class, it confers a right to use a later schedule in clearing a superior train, its sole purpose being to advance the inferior train. If, however, the inferior train meets with delay, however little, this late order becomes restrictive, for it hampers further movement because of the necessity for flag protection, unless there is a siding immediately at hand.

An inferior train while holding a meet order will be delayed just the same, under similar conditions, as if it had a time order, and the delay to the superior train will be the same, except where it is necessary for the inferior train to flag to a siding; when the late order becomes an instrument of delay,

it is not the meet order that causes the delay when an inferior train is slow to arrive at a meeting point.

Ask your train despatchers why they issue late orders, instead of a direct meet, and insist on a frank answer. The answer in a majority of cases will likely be to place on the train crew the responsibility for promptly reaching a certain point. The train despatcher usually knows where the inferior train will clear on a late order, and arranges his other train movements accordingly. He will not, however, issue a straight meet order, because if the inferior train meets with delay, avoidable or otherwise, the train despatcher is asked why he made the meet, the first thought being that he has erred in judgment. But, in fact, the delay would have been the same had he issued a late order, with the possible exception of a condition where there is more than one blind siding between telegraph offices. In that case time might be saved by having the inferior train reach the nearest siding. But the train despatcher who has an inferior train using a late order under such conditions can not safely figure on making any further moves in that particular territory, for should he do so and the inferior train then fail to reach the siding which it had time to reach, he would be likely to create a blockade. If, on the contrary, he issues a late order and the same delay occurs, in most cases making it necessary to flag to a siding, the train crew is held responsible for the delay.

Have your train despatchers understand clearly that they will not be held accountable or accused of an error in judgment if superior trains occasionally meet with delay on a meet order; instruct them to issue straight meet orders in preference to late orders wherever possible. You will be surprised at the better results obtained. There will be no possible chance of an inferior train mistaking the lateness of the superior train, and they will be free from the temptation to take chances by using the last minute allowed them on a late order.

WAYNE S. GRAEFF.

Contributed Papers.

PROPOSED ELECTRIFICATION OF ILLINOIS CENTRAL.

An exhaustive pamphlet on railroad electrification in the form of a report to the Mayor and Council Committee on Local Transportation, has been published in Chicago. Its purpose is to create a public sentiment that will hasten the electrification of the Chicago terminals of the Illinois Central and other roads. The report was prepared by Milton J. Foreman, Chairman of the Committee on Local Transportation of the City Council; Dr. W. A. Evans, Commissioner of Health; P. P. Bird, Smoke Inspector; G. E. Ryder, of the City Smoke Inspection Department, and H. H. Evans, an electrical engineer.

The preparation of this report has been in progress ever since the subject of electrification of the Illinois Central's terminal began to be agitated. A brief abstract of the principal portions of the report which relate to the Illinois Central terminal is given below:

We have concentrated our investigation upon the Illinois Central terminal. We have done this, not because of any feeling one way or the other toward the Illinois Central, but because the electrification of that road seemed to offer the most fertile field in Chicago, and mainly because of the large interest of the public in getting rid of the smoke from this railroad. We have believed, also, that by making an investigation of the Illinois Central, we could reason from our conclusions what might be advisable in the case of other railroads in the city traversing residence districts and operating a high-class suburban service. Concentration upon the Illinois Central has also been largely brought about because of President Harahan's position that the electrification of his road was a question demanding detailed investigation. We have devoted a great deal of time to an investigation of existent electrifications, because Mr. Harahan, in his letter, took the ground that electrification is still experimental, and we have found that it has passed entirely beyond the experimental stage.

In addition to a thorough examination of the physical character of the road, we have prepared an estimate of its cost and the probable savings, and we are led to the conclusion that in addition to being feasible, the electrification would be desirable as well. The Illinois Central has about 325 miles of trackage from points at which the suburban traffic originates, to the downtown terminal. It has a station at Twelfth street and Park Row into which through trains of the Wisconsin Central, the Michigan Central, the Chicago, Cincinnati & Louisville, the "Big Four," and its own trains come. In addition, it has a suburban terminal at Randolph street from which a suburban traffic, said to be the largest in the country, is worked. The north and south trackage is the terminal of a large double-track line from the Great Lakes to the Gulf, and there is a section turning and running west at Sixteenth street, to Omaha and other western points. Above Twelfth street there are large freight terminal yards, which are used by the railroads which use the terminal trackage. The tracks start with a maze of freight tracks at the foot of South Water street and the head of the line, at the western side of which there is a suburban terminal. The tracks gradually constrict to Van Buren street and from thence to Park Row a number of tracks run, including suburban tracks. At the latter point, the tracks broaden out to form the passenger-terminal trackage and passenger and freight storage yards, which converge again at Sixteenth street and below. From Sixteenth street there are six tracks to a point just below Thirty-ninth street, where the tracks broaden to 7, then to 8. In addition, there are tracks to the Twenty-sixth street round-house and sidings to a coal yard and breweries at this point.

Besides the freight terminal yard at the foot of South Water street and the passenger terminal at Twelfth street, there is a large working yard at Fordham, 11.43 miles south of Randolph street, comprising 42 miles of track; a yard at Burnside, comprising 33.5 miles, wherein are located the shops, the yard being used mainly for equipment storage and repair; and a yard at Wildwood, 16.28 miles south of Randolph street. There is a small yard containing about 3.5 miles of track at the end of the South Chicago branch, the South Chicago branch being incorporated as a separate railroad. There are about 2.5 miles of yard track and sidings on the Blue Island railroad, which is the legal designation of the Blue Island branch. On the Freeport division, there are 1.5 miles of sidings within the city limits. In addition, there are small sidings, connections to industrial plants, and team tracks at various places along the length of the road within the city limits.

The through passenger service runs into the Twelfth street depot. This depot is skirted by the suburban service. A small fraction of the freight service traverses it. From it there come and go 37 trains each way a day. Of these, six are trains which go west at Sixteenth street; five are Wisconsin Central, following the same route; eleven are Michigan Central trains leaving the Illinois Central tracks at Kensington; two are Chicago, Cincinnati & Louisville trains leaving the Illinois Central tracks at Riverdale; four are Cleveland, Cincinnati, Chicago & St. Louis trains, using the Illinois Central tracks to a point near Kankakee, and the remainder are Illinois Central, Chicago division, trains. The Chicago, Cincinnati & Louisville is owned by the Illinois Central. The Wisconsin Central and the Michigan Central have trackage arrangements with the Illinois Central, and their trains are drawn by their own engines. The Big Four get their traction from the Illinois Central.

The main line trains receive and discharge passengers at eight points within the terminal zone, Twelfth street to Kens-

ington. The western lines make two stops, Twelfth street and Halsted street. All of these trains are the usual type of heavy passenger trains, carrying mail, express, day and sleeping car passengers, and running dining cars in about the usual proportions.

Generally speaking, the trains are not as heavy as the passenger-train units running from Chicago to the Northwest. They are heavier than the swiftest units running to the East. They average about like the New York Central into New York City. As these trains are for locomotive hauling after they reach the limits of the electric zone, the heavy unit must be maintained. They require a type of electric engine that is now in fairly general use. This engine costs about 1½ times as much as a locomotive engine per horse-power.

The advantages of electric traction for through passenger traffic are largely covered under the head of general feasibility. Summarized, they are:

1. Freedom from smoke.
2. Economy of coal.
3. Better control.
4. Greater acceleration
5. Better efficiency in stopping and starting, economy included.
6. Greater pulling capacity
7. Greater speed.
8. Greater economy under a varying load factor.
9. Lesser upkeep on engine.
10. A shorter schedule.
11. Lesser engine-ton mileage.
12. Lesser dead runs for engine.
13. Lesser roundhouse cost.
14. Lesser storage track required.
15. Greater uniformity of efficiency in stormy weather.
16. The advantages to the suburban service from electrification and the disadvantage of two kinds of traction on the same tracks.
17. Greater use of the 12th street station.

Against it would be:

1. The greater fixed charge.
2. The trouble of changing engines at, say, Flossmoor, Hammond, and Riverside.
3. The trouble of readjusting the runs and the general methods.
4. The uncertainty relative to electrifying the freight terminals and the disadvantage of two kinds of traction in the terminal zone.

The suburban service of the Illinois Central runs from Randolph street on the north to Flossmoor on the south, with three spurs now in operation and a fourth just ready to begin. The western service leaves the main line near Sixteenth street and runs to Addison, a distance of 25 miles. There are but four trains a day over this line, making it a local rather than a suburban service.

The remaining services now in operation use four tracks to Sixty-seventh street, 8.4 miles, except from a point just south of Van Buren street to a point at Randolph street, .83 miles, where there are two tracks, and a short neck at Randolph street where there is but one track. The two east tracks are reserved for an express service running to Hyde Park, 6.57 miles. All four of these tracks are exclusively suburban in every division of their service.

Southeast of Sixty-seventh street there is a two-track line, 4.51 miles to South Chicago. This track is also used for freight. From Sixty-seventh street to Blue Island Junction, 6.74 miles, there are two suburban tracks not used for other purposes. From Blue Island Junction 3.83 miles is a single-track road used for all purposes. The suburban service is continued over the four-track system to Calumet Junction and the remainder of the two-track system to Flossmoor, 24.92 miles from Randolph street.

The Kensington & Eastern will run an electrically-hauled suburban service from South Bend through Gary to Kensington, where it will, for the present, transfer passengers to the regular Illinois Central service.

The Woodlawn service is local. It is usually done with two-car trains with side-loading doors. There is a train out every five minutes during the rush. The service is every thirty minutes at the laxest times. There is no service from midnight to the early morning. In this service under locomotive traction there are six elements of bad economy.

1. It piles up cars, locomotives, and crews downtown in the morning and outside in the evening. The Randolph street yard cannot stand much of this, so there is a good deal of dead hauling. Were the locomotives eliminated and the cars hauled as multiple-unit electric trains, space would be saved and dead hauling would be lessened.

2. Locomotive crews are paid by the mile and are given a certain number of miles a day. This sends an engine over different suburban divisions of the road and means ineffectiveness and interest-charge loss on a locomotive engine under steam.

3. To haul a two-car train with a locomotive engine is uneconomical.

4. Electric traction would permit of greater frequency of trains during all hours of the day.

5. The efficiency of the single track just south of Randolph street gages the efficiency of all suburban tracks from the terminal north to a south point about Twelfth street. Locomotive traction impairs the efficiency of this single track.

This part of the Illinois Central suburban service is in reality a local transportation service. It has demonstrated the potentiality of a railroad to determine the direction of growth of a city. Its patrons are not guided by time cards. As a street-car service it must conform to the operation methods of a local-transportation service or go into the scrap-heap according to the laws of economics.

Local transportation passed through horse-traction, dummy-traction (locomotive), cable to electricity, and every step was demonstration. It is not expected that the Illinois Central will experiment with the cable.

This local transportation discharges fewer passengers into the heart of the city during the rush hours than does either of the electrically operated elevated roads. Everything which it can do to develop the residence use of the lake shore will be to its profit.

Suggestions here offered are electric traction, surface feeding electric lines, more frequent trains, and a connection with a subway distributing system in the down-town district.

What might be termed the radiating systems from Sixty-seventh street are suburban services. South Chicago is largely self-contained and in consequence does not support a service into the city the proportion its population suggests. Yet to put this line on the basis of a suburban electric line with a proper feeding system will develop the region and the patronage of the road and will give the same economics of administration that suburban electric lines always give in competition with locomotive traction.

The Flossmoor service is now brought in competition with electric traction and must therefore give equal service or suffer. The Blue Island service must go to electric traction to compete with the shorter haul of the Rock Island. Over none of these lines do the trains make sufficient speed to require the most rigid type of construction. Therefore a third-rail or catenary construction will probably not be required on any except the Flossmoor service and the Kensington & Eastern.

The Illinois Central and its associated lines haul most of their freight to a freight yard extending from Randolph street on the south to the Chicago River on the north, and from the old Randolph street station on the west to the lake on the east. This yard is used jointly by the four roads, each having certain districts and certain rights within it.

It is occupied by warehouses, elevators, team tracks, coal yards. There is a large switch yard for the Illinois Central at Fordham, a storage yard at Burnside, a Michigan Central yard at Kensington and a small freight yard near Riverside and one at Wildwood. In addition, there are many milk platforms, team tracks, coal yards, storage tracks, and spurs to industrial plants along the right of way. The usual arrangement is a diverging track giving off loading and storage tracks parallel to the original track. Except for a quarter-mile west of State street on and near Sixteenth street,

it is very free from crossing tracks which would render the physical problems difficult. The trains are made up by the usual type of switch engine and they are then hauled away in heavy units. The freight trunk tracks are used exclusively as such for several miles out, so that the road is relatively free from detention of second and third class trains within the inner part of the terminal zone. The freight trunks are most heavily loaded at night. During the day hours they are fairly free from traffic, except for cars running between the different yards. Switching and spotting is done mostly during the early hours of the morning and quite considerably during the remainder of the day hours. It will be noted that the peak-load on trunk-line freight is at night, switching in the very early morning and at midday; passengers from 7 to 9 a. m. and 4:30 to 6:30 p. m. A common power plant, then, would find its load distributed throughout the twenty-four hours. Short intervals of light load could be used to store power for the different peak-hours.

Also, there can be a division of electric engines. The suburban cars will run without locomotives. The heavy use of engines by the through passenger traffic will be in the morning and afternoon, by the freight trains at night. The engines can be used interchangeably for freight and passenger use.

In considering the electrification of the Illinois Central, obviously electrification should be carried to the end of the suburban zone—that is, all trackage between South Water street and Flossmoor, (24.92 miles south) on the north and south line, should be electrified. The double-track branch from Sixty-seventh street to South Chicago, and the single-track branch from Blue Island Junction to Blue Island, would be included.

The Illinois Central has 3,428 scheduled suburban train miles daily, 1,315 scheduled suburban train-miles Sunday, 1,054 scheduled suburban train-miles passenger, 607 scheduled suburban train-miles freight.

On day observations were taken 6,435.45 observed and estimated train-miles, 2,656,435 observed and estimated ton-miles. 103,288.50 estimated kilowatt-hours. 413 tons average weight train. 40 watt-hours per ton-mile. 16.05 kilowatt-hours per train-mile. Maximum kilowatts 12,300, average kilowatts 4,303.6, minimum kilowatts 700, 35 per cent. load-factor.

In computing the probable cost of the electrification of the road we have made no provision for the purchase of a power-station, since we assume that current can be purchased locally from power-supply companies for seven-eighths cents a kilowatt-hour, or under. If this cannot be done, the railroad could put in a 12,000-kilowatt plant, which would supply current at that figure. We have allowed in our estimates a manufacturing cost of four-tenths of a cent, which is easily attainable around Chicago, with a large plant, and our estimates on this were as follows:

Power costs about $.004 per kilowatt-hour at switchboard. Station complete costs $901 per kilowatt. Assume 35 per cent. load-factor. Then we must earn carrying charges upon $257. Allow 3 per cent. to sinking fund, 5 per cent. interest, 1 per cent. taxes, 3 per cent. emergency replacement fund; a total of 12 per cent. or 1 per cent. a month.

Carrying charges on 1 per cent. of $257 equals $2.57 per month for 730 hours, or $.0035 per kilowatt-hour. Total cost, $0.0075 per kilowatt-hour.

[The report gives in detail the estimated cost of electrification and states the total cost to be $3,356,931 (not including a power house). It estimates the net saving per annum would be $264,097, or 6.6 per cent. on an investment of $4,000,000.]

An article in the *Journal* of the German Railroad Union calls attention to a fact too little appreciated outside of the rolling-stock department of the railroads, which is the necessity of very great additions to repair shops accompanying the recent great expansion of traffic and increase in rolling-stock, which was probably greater in Germany after 1904 than anywhere else in the world, except this country. The number of freight cars in the Prussian-Hessian system increased from 324,618 at the end of 1905 to 347,410 in 1906, and 371,948 in 1907—more than 14 per cent. in two years, and there was a similar increase in the number of locomotives. The regulations require a general overhauling of every freight car every three years, aside from other necessary repairs, requiring an average of one week in the shop. This means that there must be additional places in the shops for an average of 440 cars to accommodate the additions made in two years, provided the work is distributed regularly through the year. But this cannot be done. During the season when traffic presses every car that can run safely is kept in service, and the actual overhauling is restricted to half of the year, making necessary additional places for 880 freight cars for the additions of two years, in this part of the rolling-stock alone, to say nothing of locomotives and passenger cars. In Prussia the pressure will be first felt fully in 1909, when the large additions of 1906 are to be overhauled.

RAILWAY SIGNAL ASSOCIATION.

The annual meeting of the Railway Signal Association was held in Washington, D. C., on Tuesday, Wednesday and Thursday of last week, with President A. H. Rudd in the chair. There were present about 100 active members and there was a total attendance of 250 to 300. Mr. Rudd, in his opening address, spoke of the large membership, now about 1,100, and called attention to the fact that 4 per cent. of the total membership, or about 8 per cent. of the active membership, is in foreign countries. There are now 43 representative members, representing a majority of the larger roads of the country. The Chesapeake & Ohio and the Southern Pacific are the latest accessions to this list. The signal engineer of every important railroad in the country is a member of the association. The American Railway Engineering and Maintenance of Way Association, in all important matters which have been brought before it, has adopted the conclusions of the signal association, and the American Railway Association is, no doubt, ready to accord the signal engineers all proper endorsement. President Rudd suggested that the association should take fitting action toward referring the conclusions of the association to the A. R. A. He also recommended the establishment of more intimate relations with the American Street and Interurban Railway Association, which association now has important signaling problems to deal with.

Secretary C. C. Rosenberg reported receipts from membership during the year of $3,486, and total receipts, including balance at the beginning of the year, of $7,991. The total expenses were $5,764, and the balance on hand $2,227. On both sides of this account there is an item of about $1,000 for the banquet at the last annual meeting.

Resolutions were passed instructing the executive committee to carry out the recommendations of the president in regard to affiliations with the two other associations named. The executive committee was authorized to hire an office for the secretary, and the secretary is to have a permanent clerk.

The meeting then considered the various amendments to the constitution which had been proposed in the announcement, and adopted them. The most important of these is one changing Article IX. so that henceforth there will be only three meetings a year instead of five, as hitherto. The annual meeting is on the second Tuesday in October, and there will be one meeting in Chicago on the Monday before the third Tuesday of March, and one in New York on the second Tuesday of May. There was considerable sentiment in favor of having the May meeting come three or four weeks later, and it is possible that the executive committee, which has the necessary power, will change this date. An alternative proposition to change the meetings, still retaining the provision for five a year, was presented, apparently because of some misunderstanding among the proposers of the different

amendments, but it was not voted on. The other amendments were as follows:

Article II., Section 6.—An honorary member shall be a person of acknowledged eminence in railroad engineering or management. The number of honorary members shall be limited to ten.

Article III., Sec. 3.—Honorary members shall be proposed by at least ten active members. The proposal shall be forwarded to the Secretary-Treasurer, who shall furnish each member of the Executive Committee with a copy, and 30 days thereafter the Executive Committee shall vote thereon by ballot. If a candidate shall receive the unanimous vote of the Executive Committee he shall be declared an honorary member.

Article III., Section 4.—A provision is added, to the effect that each three-position arm combining the functions of a home and a distant, shall be counted as two working arms.

Article V.—This article is amplified so as to provide for electing officers by letter ballot. A nominating committee is to be appointed in May, which shall by June 1 present nominations to the executive committee. Between that time and August 1 members may send in additional nominations. By June 1 the Secretary must notify members of this privilege. During August the executive committee shall prepare a ballot containing the reguiar nominations, and other nominations which are proposed by at least 25 qualified members. The ballots are to be mailed to active and junior members a month before the annual meeting, and votes must be in by noon of the first day of the meeting. The persons receiving the highest number of votes for the offices for which they are candidates shall be declared elected.

Article VI., Section 4.—The executive committee shall employ an expert accountant to audit the accounts of the Secretary-Treasurer.

Article X.—Proposed amendments to the constitution must reach the Secretary by August 1, and they may be amended at the annual meeting by the proposers, or with their consent given at or after the meeting; then the proposed amendment shall be submitted by November 15 to letter ballot. The ballots will be counted December 15, and if the amendments are adopted they take effect January 1, following.

The first committee report taken up was that of Committee No. 3, B. H. Mann, Chairman, on specifications for electric interlocking; and, adopting a resolution offered by the committee of arrangements, the meeting decided to limit the discussion on this report to one hour. This committee divided its report into blocks of 20 sections each, and asked to have these blocks approved successively. After a desultory discussion of a few clauses of the specifications, all were adopted, except paragraphs 130 and 131, relating to signaling for drawbridges, which were held to be not germane to the subject of specifications. Paragraph 62, dealing with detector bars, was amended so as to make it clear that the specifications refer only to bars fixed on the outside of the rail.

This committee in its report gave a few historical notes. The first power plant built was a pneumatic machine which was erected and put into service in 1876 at the south end of the "Y" leading to the Centennial tracks at West Philadelphia. A hydraulic machine was first put into service at Wellington, Ohio, in 1880. A hydro-pneumatic machine was first put into service at Bound Brook, N. J., in 1884. An electric machine was first put into service at Cincinnati, Ohio, in 1890. The electro-pneumatic machine was first put into service at Jersey City, N. J., in 1891.

TUESDAY AFTERNOON.

The time allotted for the discussion of the report of committee No. 2, C. J. Kelloway, Chairman, on specifications for mechanical interlocking, was from 2 to 3 p.m. This committee had divided its report into five subjects. The first subject was protection of drawbridges, and the conclusions of the committee were adopted with slight amendments. Distant signals had been classed as adjuncts, but the association resolved that high home signals, *with proper approach indication*, should be provided. The provision that each rail at the ends of a drawbridge should be locked was changed by cutting out the word "lift." The meeting was not unanimous in the opinion that lift rails are desirable. Subject No. 2 dealt with facing-point locks. The provision that facing derails shall be bolt locked with signals, was amended to read with *mechanical* signals. The sizes of the notches in the bars at the point of locking were slightly changed.

The third subject in this report dealt with circuits for interlocking signals. The committee reported that this subject had been too difficult to deal with in the time at its command. The fourth subject was signal lamps. The specifications recommended by the committee were adopted and referred to committee No. 1 (on standards). This report proposed a new form of bracket for signal lamps, which the meeting was not ready to adopt, hence the reference to committee No. 1. The fifth subject dealt with general specifications, the committee having re-edited the specifications heretofore adopted by the association. These specifications fill over 20 pages, and a number of members brought up points which they wished to discuss but, profiting by the time-wasting experiences of past meetings, the association sustained the chair in discouraging discussion, and the subject was finally disposed of very nearly within the time allotted by the committee on arrangements. No code of specifications is satisfactory to everybody, and the view prevailed that these specifications, being undoubtedly an improvement on those now in use, should be adopted for that reason alone. After a slight change in paragraph 53, and on motion of Mr. Elliott, seconded by Mr. Rudd, the whole code was adopted. The remainder of the afternoon, in accordance with the recommendation of the committee on arrangements, was devoted to the reports on storage battery and on automatic stops and cab signals. The report of the committee on storage batteries, A. H. Yocum, Chairman, contained an interesting history of the subject (reprinted in another column) supplemented by a code of detailed rules, filling 15 pages, for the installation and care of such batteries. The report was accepted as a progress report; but later in the meeting this action was reconsidered, and the rules presented were adopted as those of the association, to be sent to letter ballot. (All standards, etc., in these reports go to letter ballot for a final vote before becoming the standards of the association.)

The report of committee No. 7, C. C. Anthony, Chairman, was a brief statement announcing the completion of the Railroad Signal Dictionary, and it was adopted unanimously without debate. The report says:

> . . . The first edition of the dictionary—the first complete, encyclopedic work covering the whole field of railroad signaling published in America, was issued by the *Railroad Age Gazette* about August 1, 1908. The title page bears the words, "Compiled for the Railway Signal Association." The Committee feels that the Association may well view with satisfaction its connection with the preparation of the dictionary, and that the compilers are to be congratulated on the successful completion of this valuable work.

The report of the committee on automatic stops and cab signals, W. H. Elliott, Chairman, was discussed at length. This report is printed in another column. The first criticism was on paragraph 1 of the requisites of installation, and it was finally voted to cut out the last three lines, "to prevent trains from entering the block," etc. The same idea, however, was approved in a modified form, a clause being added to the effect that the devices should be capable of being so arranged that an automatic stop shall not act where the speed of a train is five miles an hour or less. This clause was adopted by a vote of 26 to 17. Mr. Waldron, of the Interborough, protested against the adoption of this proviso, holding that the only proper way to use an automatic stop is to make it act invariably. Much discussion was necessary at this point to make clear the principle that, in ordinary rail-

road service, while enginemen must be required invariably to stop at a stop signal, this requirement must be enforced by a rule, and not by an automatic stop. Vice-President Clausen felt certain that no automatic stop would ever be used alone, without other signals; therefore it is important to call it an adjunct.

In requisite No. 4, the last 11 words were cut out as unnecessary.

Paragraph 8 was amended so as to make it apply to automatic stops alone (not cab signals). Paragraph 11, declaring insulated wheels and axles unreliable or unsatisfactory, was cut out. This clause was explained by the committee as including devices which require a tender to be insulated from the engine. Some members thought that insulation was at least possible, and therefore that the prohibition should not be insisted on at the present time.

Other slight modifications were made, but there was nothing of importance until paragraph 13 was reached, declaring that automatic stops and cab signals are only adjuncts to a fixed signal system. There was some argument for the elimination of this clause, but it was finally adopted unanimously. The whole report was then adopted and, with the others, will go to letter ballot.

WEDNESDAY.

The first business on Wednesday was the discussion of the report of committee No. 1, A. H. Rudd, Chairman. The main features of this report are printed on another page. The vice-chairman of the committee, explaining diagram No. 104, said that the arrangement of the semaphore with two lunar white lights side by side (4B) was designed for use at a closed block signal station. The 14 heads in this diagram were taken up in order. No. 1 was adopted. Taking up No. 2 Mr. Elliot moved that the lower arm be shown in dotted lines, thus making the use of that arm optional. The presence of the lamp on the post is a sufficient indication in the day time as well as at night. After a long and desultory discussion Mr. Elliot's motion was voted down. No. 3, the adverse indication at an ordinary switch, not interlocked, was adopted. Taking up No. 4, there was a motion to cut out 4 B, but this was lost and No. 4 was adopted as it stands.

After another long discussion, in which it appeared that the committee had considered an elaborate scheme presented by Mr. Stevens (A., T. & S. F.) for having all top arms give to enginemen instructions for their *immediate* guidance and all second arms instructions for *future* guidance, the whole of the rest of the diagram, Nos. 5 to 14 inclusive, was adopted by unanimous vote.

A sub-committee of No. 1, J. C. Mock, Chairman, presented a report embodying (1) specifications for 1-in. pipe and coupling; (2) for malleable iron castings; (3) machinery steel; (4) wrought iron bars; (5) signal roundels, lenses and glass slides, and (6) drawings of standard designs for 39 parts in signaling, chiefly mechanical interlocking. These standards are for:

Wire Adjusting Screw	Straight Solid Jaw (Tang End)
Pipe Adjusting Screw	Offset Solid Jaw (Tang End)
Obtuse Angle Crank	Wide Jaw (Tang End)
Acute Angle Crank	Slotted Jaw (Tang End)
Three Arm Crank	Screw Jaw
Equalizer	Solid Jaw (Butt End)
9-in. by 9-in. Crank	Tang End
11¾-in. by 11¾-in. Crank	Straight Adjustable Link
14½-in. by 14½-in. Crank	Offset Adjustable Link
1 Way Crank Stand	Standard Ladder for Pipe Post
2 Way Crank Stand	Top of Ladder
One and Two Way Crank Pin	Sides for Ladder Stays
1 Way Crank Stand Complete	Front and Back Clamps for Stays
2 Way Crank Stand Complete	Standard Pipe Signal Post
1 Way Compensator Base	Standard Pipe Signal Post
2 Way Compensator Base	Standard Pipe Signal Post
1 Way Compensator Complete	Eye Rod, Lug and Pin
2 Way Compensator Complete	Base for 8-in. Signal Post
One-in. Pipe and Coupling	Base for 6-in. Signal Post
Straight Solid Jaw	

These drawings and specifications were fully discussed at the September meeting of the association in Chicago. The report contained full-page copies of these drawings as they were shown at Chicago, accompanied by a memorandum showing 10 slight errors needing to be corrected. Mr. Mann (Mo. Pac.) said that at the Chicago meeting there was no important criticism of the standards; but a number of members, nevertheless, asked questions concerning some of the specifications. These questions involved criticisms of details in specifications for pipe, page 5, paragraph 3, last clause; paragraph 4, and others. The requirement as to freedom from cracks outside the weld was modified as being too severe. The weight per foot, 1.67 lbs., was changed to read 1.71 lbs. In paragraph 10 the screw threads should be slightly rounded, not "V." Couplings and rivets must be galvanized. With these modifications the specifications for pipe were adopted; and then after a little further discussion the whole report was adopted, to be subjected to letter ballot.

The next report was that of the committee on rubber-covered wire, Azel Ames, Jr., Chairman. This report contains elaborate tables showing the effects of impurities in copper wire and a chapter describing the properties of copper. The report contains specifications similar to those heretofore adopted, with changes in five paragraphs, as follows:

Paragraph 5, Physical Tests of Copper Conductors.—A change in the torsion requirements to suit the various sizes of conductors.

Paragraph 8, Tests of Braiding.—Correction made to include the weight of tape in making the absorption test.

Paragraph 9, Physical Tests of Rubber Insulation.—A $\frac{7}{64}$-in. set instead of a $\frac{5}{32}$-in. set is permitted on account of many excellent compounds not being able to quite meet the requirements of a $\frac{5}{32}$-in. set.

Paragraph 10, Chemical Tests of Rubber Insulation.—An ash test has been added, with a minimum of 62 per cent. and a maximum of 68 per cent., the committee believing that this will aid materially in determining whether or not the proper amount of rubber has been put into the compound.

Paragraph 11, Electrical Tests of Rubber Insulation.—It has been found that 100 volts is sufficient potential for the testing battery for insulation resistance and that most manufacturing plants are not equipped with batteries capable of showing 150 volts as per the former specifications.

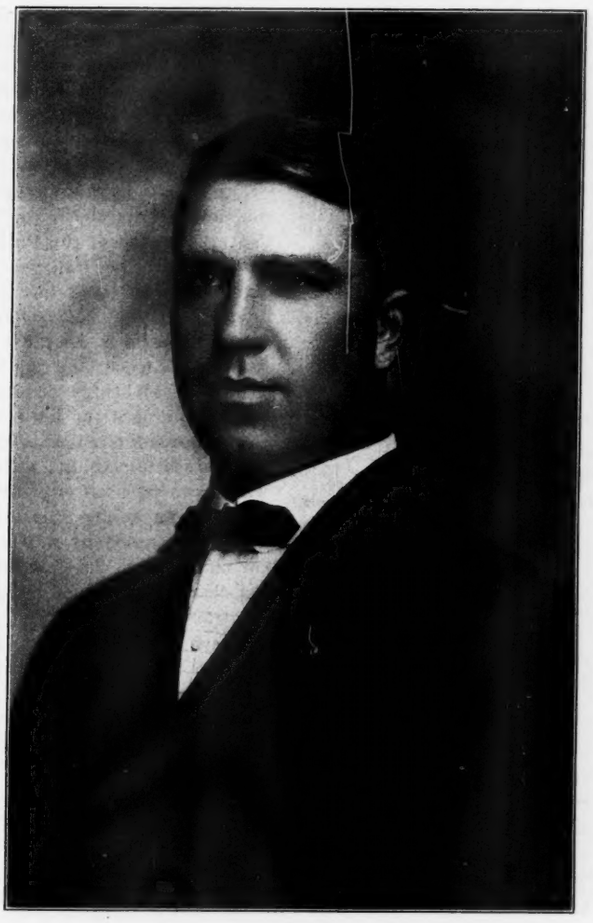
Mr. Ames, in presenting the report, told of the action of the committee in relation to complaints which had been made because the specifications are so drawn as to exclude kerite. The Rubber Covered Wire Engineers' Association had presented to the committee an elaborate memorandum concerning insulation, in which it said among other things:

A compound known as Kerite is so entirely different in its nature from all other compounds used for insulating, we have found it impossible to suggest a specification unless all reference to acetone extract, mineral matter, and ash test be left out, that will include it, and at the same time be a satisfactory specification for other compounds; and inasmuch as wires insulated with Kerite have been in use for fifty years, and have proved their merit, we suggest that a special specification be made for them, in which the mechanical and electrical requirements be the same as called for by general specifications.

Mr. Ames said that the committee recognized the undesirability of barring out the maker of a good product; but at the same time it would be hardly proper to prepare specifications for a compound the ingredients of which are unknown. Of course any road or group of roads can make independent specifications which will include kerite. Other objections had been made by manufacturers to certain of the committees' decisions. Mr. Ames, however, after explaining what the committee had done, and showing that it had undoubtedly given full and fair consideration to all interests, moved the adoption of the report. This motion was seconded by Mr. Stevens, who said that, as the specifications were in essentials about the same as those adopted two years ago, and as there was a full discussion at Milwaukee one year ago, there was no question that the code should be adopted. Certain other details were then briefly discussed. Paragraph 3, page 36, was objected to on the ground that taping is in some situations

unnecessary, but it was not disturbed. The paragraph dealing with conductors (page 35) was amended by making it read "pure copper, Matthiessen's standard." Paragraphs 5, 8 and 9 were adopted.

Paragraph 10 was discussed at length. It was proposed that the clause limiting the percentage of acetone extract be reduced from 6 per cent. to 5, but Mr. Langan said that such a change would increase the cost of the insulation 25 per cent. Mr. Waldron said, however, that that would be one of the best ways to get 30 per cent. of rubber; or, by changing the specifications regarding resistance (in the table, on page 38) a satisfactory percentage of rubber could be insured. The motion to change the percentages in paragraph 10 was again urged, but it was strenuously objected to unless time could be taken to rehearse the reasons both for and against such a change. Mr. Langan proposed that the paragraph be modified to conform to a recent recommendation of the chief expert of the navy department, who would stipulate as follows: Rubber, 30 per cent.; free sulphur, not over 0.5 per cent.; not over 2½ per cent. of sulphur in any form; not over 4 per cent. of waxy hydrocarbons. This proposition was lost. It was again proposed (by Mr. Rudd) to change the percentage in paragraph 10 from 6 to 5, but it was explained that many manufacturers wanted this percentage made 10 rather than 6 and that insulation could not reasonably be made durable otherwise, and Mr. Rudd's proposition was voted down. Paragraph 10 was then adopted as it stands, followed by the adoption of paragraph 11 and then by the adoption of the entire report.



L. R. Clausen.

THURSDAY.

On Thursday morning the report of committee No. 4, C. E. Denney (L. S. & M. S.), chairman, was taken up for discussion. This report embraced an elaborate set of specifications for automatic semaphore block signals, operated by direct current for steam railroads. The chairman of the committee pointed out an error in the arrangement of paragraphs under clauses 7 and 8, which will be obvious to the careful reader. This report was criticized only a little, but there was considerable discussion on the desirability of having these specifications and those on mechanical and power interlocking made consistent with one another in all respects, and the executive committee will, no doubt, provide for the necessary editing to accomplish this.

The next report discussed was that of committee No. 5, S. P. Hull (N. Y. C.), chairman, embracing a set of specifications for manual block signaling. This committee had not considered single-track blocking, and the report was devoted mainly to the controlled manual system. No circuits are given, however, because the essentials of installation may be fulfilled by several different circuit arrangements and designs of apparatus. The report, therefore, consists of (1) a code of rules for the organization of the signal department; (2) rules for the work of maintenance and for the keeping of records; and (3) the essentials of installation. The prevailing opinion in the meeting was that organization should not be dealt with by this committee and, after some discussion on this point, the report was referred back.

The association voted to hold the next annual meeting at Louisville, Ky., and then proceeded to the election of officers for the ensuing year, which resulted as follows: President, L. R. Clausen, superintendent of the Chicago & Milwaukee division of the Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.; second vice-president, C. E. Denney (L. S. & M. S.), Cleveland, Ohio; (the first vice-president is H. S. Balliet, who holds over); secretary-treasurer, C. C. Rosenberg, Bethlehem, Pa.; members of executive committee, C. C. Anthony (P. R. R.), Philadelphia; J. C. Young (Union Pacific), Omaha.

Leon Raymond Clausen, the new President, was born October 18, 1877, at Fox Lake, Wis. He graduated in electrical engineering from the University of Wisconsin in 1897. He was connected with the Cutler Hammer Co., at Milwaukee and the Chicago Edison Co., until February, 1899, when he entered railroad service as a train baggageman on the Chicago, Milwaukee & St. Paul and was a little later appointed electrician in charge of the storage batteries of the electric lighting equipment at the Chicago passenger yards. From September, 1900, to May, 1901, he was connected with the Sunset Telephone Co., and the Eastern Lumber Co., at Portland, Oregon. In May, 1901, he returned to the Chicago, Milwaukee & St. Paul as signal inspector, and in August, 1903, he was appointed signal engineer. In November, 1907, he was made superintendent of the Prairie du Chien and Milwaukee divisions of the same road, with headquarters in Milwaukee. On May 1, 1908, he was appointed superintendent of the Chicago and Milwaukee division of the Chicago, Milwaukee & St. Paul, with headquarters in Chicago.

On Wednesday afternoon the members paid their respects to President Roosevelt, who spoke briefly. He said that of all the things asked of him since he had been president, those asked by railroad men had been the most reasonable; he had found it more nearly practicable to grant what they wished. He admires railroad men because they have the capacity to obey, and obey promptly, and at the same time the capacity to assume responsibility when necessary. Following the visit to the White House, the members, many of them accompanied by their wives, were shown around the yards of the new Union station by Superintendent G. W. Martin, of the Washington Terminal Company, and S. G. Johnson, of the Union Switch & Signal Company. The Union company has lately completed the signals at this terminal. The visitors were furnished

with a memorandum containing interesting facts about the station, from which we quote:

STATEMENT OF COST, WASHINGTON TERMINAL.

Philadelphia, Baltimore & Washington:		
Revision line and change of grade, Washington	$2,500,000	
Freight yards and tracks	1,000,000	
New Long bridge across Potomac	880,000	
Magruder branch (entrance to Union Station)	4,150,000	
		$8,530,000
Baltimore & Ohio:		
Washington branch changes	$600,000	
New freight and coal yards	1,900,000	
		$2,500,000
Joint, P., B. & W. and B. & O.:		
Joint engine and coach facilities		$4,500,000
Washington Terminal Co.:		
Tunnel and south approach to station	$2,500,000	
Terminal building and north approach to station	13,000,000	
		$15,500,000
		$31,030,000

STATION AND TRACKS.

Station.

Size of station building proper	633 x 211 ft.
Height of main waiting room	93 "
Size of general waiting room	220 x 130 "
Concourse	760 x 130 ft., or 97,500 sq. ft.
Platforms, width and length	width, 20 x 700 ft. to 900 ft. long.
Express building	420 x 60 ft.
Power house	238 x 77 "

Tracks.

Total length of tracks Washington Terminal Co.			45 miles
Number of upper level	20	Number of lower level	13
Longest	15 cars	Shortest	7 cars

Tunnel Under First street (In front of Capitol).

Two tubes.....Each 16 ft. wide, 17 ft. clear height, 4,051 ft. long.

Coach Yard.

		Aggregate length.	Capacity, cars.
Number of tracks	56	33,150 ft.	495
Pullman coach yard	11	7,250 "	112
Railroad coach yard	45	25,900 "	383

Engine Terminal.

Engine houses, two semi-circular	25 stalls each
Two turntables	Each 80 ft. diameter, electrically driven.
From turntable pit to inner wall of engine house	75 ft.
Width of engine house	95 "
Two ash pits for four tracks, each pit	160 ft. long.
Two water tanks, each:	
Diameter	24 ft.
Height	50 "
Total capacity	320,000 gals.
Coal trestle:	
Length of approach	735 ft.
Height	35 ft. 6 in
Length of trestle proper	248 ft. 8 in.

Daily Train Movements.

From the South, 22; to the South, 22; total	44
From the North—P. R.R., 35; B. & O., 46; total	81
To the North—P. R. R., 35; B. & O., 46; total	81
Total	206

INTERLOCKING (Electro-pneumatic).

"K" Tower—Head of train shed:
191 levers controlling as follows:
75 levers for 65 single switches and 27 double slips with movable frogs;
65 levers for 227 signals.
19 levers for locking between towers.
Total: 163 working levers and 28 spare spaces.

"C" Tower—New York avenue:
71 levers controlling as follows:
21 levers for 7 single switches and 14 double slips with movable frogs;
31 levers for 104 signals.
6 levers for locking between towers.
Total: 58 working levers and 13 spare spaces.

"A" Tower—Massachusetts avenue—North portal First street tunnel:
29 levers controlling as follows:
9 levers for 7 single switches and 2 double slips with movable frogs;
10 levers for 23 signals;
1 traffic lever.
Total: 20 working levers and 9 spare spaces.

A plan of this station was published in the *Railroad Gazette* January 15, 1904, and a plan of the tracks from New York avenue northward, including the engine house yard, was given November 11 of the same year. The largest signal cabin is that at K street. In this cabin there is an illuminated track indicator 19 ft. 6 in. long, 5 ft. 5 in. high. In this indicator, the face of which is black, the diagram of tracks consists of thick lines made of translucent colorless glass, behind which are electric lights, controlled by track circuits. The tracks embraced in the diagram are divided into 130 track circuit sections. When these sections are unoccupied, the track circuit being energized, the light or lights for that section glow; and the presence of a train on a section, de-energizing the track relay, causes the corresponding section of the diagram to show dark instead of light.

The signal bridges in this yard are some of the most imposing ever built, and the longest one is of 145-ft. span. There are 18 in all, ranging from this length down to 33 ft. The signal cabins are provided with complete equipments of indicators, train describers and other appliances for conveying information quickly from cabin to cabin and between cabins and the station. The wire circuits extending from the K street cabin to the passenger platforms, and providing communication with the conductors of departing trains, terminate in electric lights fixed in the iron columns which support the butterfly sheds. Most of the platforms have five lights in as many different posts at intervals along the length of the platform. The lights are normally dark; when they glow, they constitute a signal from the cabin to the conductor. The conductor closes the circuit by means of a key, which he carries in his pocket, the circuit closer being thus protected from disturbance by unauthorized persons. A signal given by the towerman lights all of the five indicators on a platform simultaneously. The gateman is at the same time notified, and in the same way.

The signals at this station are three-position upward-inclination and are arranged for speed signaling, like those on the Central division of the Philadelphia, Baltimore & Washington, described in the *Railroad Gazette* of October 19, 1906, and March 15, 1907, and like those at the Broad Street Station, described in the *Railroad Gazette* of April 24, 1908, page 583. The upper arm is cleared for unlimited speed, the second arm for limited speed, and the lower arm, which is below the floor of the signal bridge, for low speed. The low-speed arms, besides being used for low-speed routes, may be cleared for any route, special circuits being provided for this. By the use of this special circuit, which is closed by a push button, and which can be used only by special authorization of the train director, an engine, for example, may be sent into a section already occupied by a train, as for the purpose of taking a car off from the rear, or for pushing a stalled train. The button closing the special circuit frees the signal from control by the track circuits.

There are no mechanical detector bars in this yard, track circuits being used for this purpose throughout. The track circuits all extend at least 100 ft. ahead of the switch point and back to the fouling point. There are levers in all the machines by which electric locking can be maintained from cabin to cabin, so as to provide absolute safety for the movement of trains in either direction on any track. All track circuits are fed from storage batteries at two volts. The total number of track circuits is 263. The line from the station southward runs in a tunnel beneath the station and the capitol grounds, and in this tunnel "light" signals are used.

EXHIBITS.

Adams & Westlake Company, Chicago, Ill.—Signal lamps, drawbridge lamps, signal tower lamps, long-time burners for semaphore, dwarf, train order and switch lamps; locks for signal boxes. Represented by W. H. Baldwin, E. L. Langworthy, A. S. Anderson, C. B. Carson, W. J. Piersen and F. N. Grigg.

American Railway Signal Company, Cleveland, Ohio.—Single and double mechanism signals for automatic blocking, operating in either two or three positions; dwarf signals, electric switch lock; three types of relays, tower and switch indicators. Represented by H. D. Abernethy, H. M. Abernethy and G. L. Weiss.

American Vulcanized Fibre Company, Wilmington, Del.—Fibre angle plates and end posts; washers and bushings. Represented by John Barron.

Bossert Manufacturing Company, Wm. F., Utica, N. Y.—Switch point adjusters, insulated rail joints; semaphore blades, clasps. Represented by Wm. F. Bossert, M. W. Shuler and F. W. Sessions.

Bryant Zinc Company, Chicago, Ill.—Crossing bells; all kinds of battery material and general railroad signal supplies. Represented by M. R. Briney, C. B. Schoenmehl, H. J. Hovey and W. K. Sparrow.

Buda Foundry & Manufacturing Company, Chicago, Ill.—Motor cars and track drills. Represented by Wm. Prescott Hunt, Jr., Lawrence Hamill and R. M. Smith.

Continental Signal Company, Chicago, Ill.—Photographs and blue prints of semaphore mechanism. Represented by W. A. D. Short.

Dressel Railway Lamp Works, The, New York, N. Y.—All forms of railroad signal lamps; long-time burners and founts. Represented by

F. W. Dressel, Robert Black, Frank W. Edmunds, Edward W. Hodgkins and H. S. Hoskinson.

Duplex Metals Company, New York, N. Y.—Monnot copper-clad wire, bond wires, bare, weatherproof and insulated line wire. Represented by Jas. F. Kinder and J. B. Gibin.

Edison Manufacturing Company, Orange, N. J.—Edison and BSCO batteries. Represented by F. J. Lepreau, E. W. Brown, R. N. Baker, and W. M. Brodie.

Electric Storage Battery Company, Philadelphia, Pa.—Portable and stationary types of storage batteries; instruments for operating. Represented by Hugh Lesley, H. E. Hunt and H. M. Beck.

Fairbanks, Morse & Company, Chicago, Ill.—Two motor cars, No. 2J and No. 0. Represented by A. A. Taylor, R. A. Paterson, E. M. Fisher, J. A. Steele and B. F. Kelley.

Federal Signal Company, Albany, N. Y.—Electric interlocking machine, electric dwarf signals; electric switch gear; switch guard; hand release; tower indicator; circuit controller and switch box Represented by J. T. Cade, Geo. E. Ellis and A. Dean, Jr.

Fibre Conduit Company, Orangeburg, N. Y.—Fibre conduits. Represented by W. K. Sparrow

General Electric Company, Schenectady, N. Y.—Three-position and two-position signals; A. C. signals; mercury arc rectifier; switch indicators; relays; time release; lightning arresters. Represented by Frank Rhea, F. B. Corey, W. V. Moak and W. W. Brown.

General Railway Signal Company, Rochester, N. Y.—Duplex non-fusible relay contact; model of No. 5 signal; two- and three-position semaphore signals; bridge circuit closer; model of No. 9 neutral type and polarized relays; station block instruments; improved universal detector bar clip; improved Style B lock; time element indicator; reversing device for motors using but two wires. Represented by W. W. Salmon, H. M. Sperry, L. Thomas, J. H. MacDonough, M. F. Geer, J. L. Langdon, W. K. Howe, H. C. White, Frank Moffat, F. L. Jones and F. L. Dodgson.

Gordon Battery Company, New York, N. Y.—Primary batteries. Represented by E. M. Deems and W. M. Kinch.

Gray & Sons, Peter, Boston, Mass.—Semaphore and switch lanterns; train order lanterns; a new upper quadrant semaphore lantern; double filament electric lamp; chimneyless long-time burner. Represented by Geo. M. Gray, and J. M. Brown.

Hall Signal Company, New York, N. Y.—Motor signal operating mechanisms; electro-gas operating mechanisms; electric slots; switch and tower indicators; various types of relays; drawbridge circuit controllers; commutators and disk signal instruments. Represented by Wm. P. Hall, J. J. Kennedy, W. J. Gillingham, Jr., C. W. Coleman, R. A. Becker and W. H. Lane.

Handlan-Buck Manufacturing Company, St. Louis, Mo.—Signal lamps and lanterns. Represented by A. H. Handlan, Jr.

Hayes Track Appliance Company, Geneva, N. Y.—Hayes derails; models A, C, CX and E with operating and target stands. Represented by S. W. Hayes.

Kerite Insulated Wire & Cable Company, New York, N. Y.—Incorporated by W. R. Brixey. Kerite insulated wire; also showing one of the largest biscuits of pure Para rubber ever imported. Represented by R. D. Brixey, P. W. Miller, J. A. Renton, J. V. Watson and B. L. Winchell, Jr.

Railroad Age Gazette, New York, N. Y.—Represented by E. A. Simmons, B. B. Adams, and F. S. Dinsmore.

Railway Equipment & Publication Company, New York, N. Y.—Represented by J. Alexander Brown.

Rail Joint Company, The, New York, N. Y.—Weber and continuous insulated rail joints for all sections of rail. Represented by V. C. Armstrong, E. T. Schermerhorn, R. W. Smith and E. A. Condit, Jr.

Railroad Supply Company, Chicago, Ill.—Block signal and crossing bell relays; crossing bells, lightning arresters; battery supplies; electric switch locks and signal appliances. Represented by E. W. Vogel and H. M. Buck.

Signal Engineer, The, Chicago, Ill.—Represented by L. B. Mackenzie.

Simmons Hardware Company, St. Louis, Mo.—The Groff drill; enameled steel signs and semaphore arms; signal padlocks; the Nye solid type die; axle lighting belting. Represented by J. B. Webb and C. B. Groff.

Stanley & Patterson, New York, N. Y.—Apparatus for crossing signals; electrical supplies. Represented by Frank W. Eastman.

Tablet & Ticket Company, The, New York, N. Y.—Cut and gummed paper letters and figures. Represented by Wm. J. Martwick and A. E. Lavallette.

Union Switch & Signal Company, Swissvale, Pa.—Sample relay and pamphlets for distribution. Represented by J. G. Schreuder, S. G. Johnson, J. S. Hobson, G. A. Blackmore, W. E. Foster, T. H. Patenall, W. M. Vandersluis, V. K. Spicer and A. G. Wilson.

Waterbury Battery Company, Waterbury, Conn.—Primary batteries. Represented by C. B. Schoenmehl.

Watson Insulated Wire Company, Chicago, Ill.—Insulated wire (with Kerite Insulated Wire & Cable Co.). Represented by J. V. Watson and B. L. Winchell, Jr.

Westinghouse Machine Company, The, East Pittsburgh, Pa.—Storage batteries for signal service and power plants. Represented by D. C. Arlington, Edgar Lewis, Wm. G. Davis, S. B. Dusinberre and L. H. Flanders.

Whall & Co., C. H., Boston, Mass. —Fibre material for track circuit insulation. Represented by F. R. Whall.

The railroads in the north of Norway are trying coal mined in the Arctic zone on the island of Spitzbergen, where two companies are mining it, one Norwegian, and the other American and Norwegian. The latter has a cable conveyor which takes the coal at the mine and delivers it over the ship in the harbor on the west side of the island, and it mines the winter through, though vessels cannot come for coal at that season. Several steamers have been using the coal, and there is a fair prospect that this fuel will supplant English and other imported coal on the Arctic coast and part of the Scandinavian peninsula.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS

The annual meeting of the National Association of Railway Commissioners was held at Washington, October 6, 7 and 8, with about 60 members present. President McChord's opening address dealt with the necessity of better co-operation in railroad control. After sketching the general necessity for such control he said: "While much has been accomplished we have so far failed to bring about practical uniformity of regulation. If each commission is to be governed by a purely selfish policy and each state is determined to obtain for its own citizens the lowest rates and best service possible without reference to the effect upon rates and service in other states and without reference to the effect upon carriers of similar regulations by other states and by the United States government, regulation will in the end prove a failure and both the carriers and the people will ultimately find refuge in Government ownership, which would present problems of much greater difficulty than those which now present themselves for solution.

* * *

"The New York Public Service Commission law of 1907 is one of the most comprehensive and carefully drawn state laws for the regulation of railroads that has yet been enacted and with slight changes which experience may show to be necessary will probably be taken as the model of future state legislation. From every standpoint it is desirable that state laws regulating railroads should as far as practicable conform to Federal laws upon the same subject. Mr. McChord advocated regular reports of car supply and distribution."

On the second day the chief address was by Chairman Knapp, of the Interstate Commerce Commission on Government mediation in railroad labor disputes. In speaking of the question of government mediation the speaker said that his experience extended over only about two years, that being the time during which the Erdman act had actually been called into service. He thought that the reason no use had been made of it during the preceding five or six years of its life was that these years had been a period of rising wages and great prosperity and railroad disputes were few in number. During the past two years, however, work had been active, and Mr. Knapp thought that the act would continue to be availed of extensively in the future. Under this act the whole operation of mediation is permissive only. This has led him to doubt the wisdom of the law, but he now hesitated no longer in considering it effective and desirable. The thing which had changed his mind toward it and had made him view the purely permissive aspect of it with greater favor was that contrary to the situation in a judicial award, the controversies at issue in cases demanding a mediation usually related not to the past, but to the future. Consequently the public came in as a third party to the case and the power of public opinion was enlisted to enforce the award arrived at. He favored mediation rather than arbitration, because mediation allowed both sides to agree in a voluntary manner, while the results of arbitration often left bad feeling. The chairman said that he believed in organized labor and that as a member of the mediation board he had found the representatives of railroad labor organizations as conciliatory in settling disputes as are representatives of railroad companies.

Mr. Knapp then spoke of the rights of the public in such disputes as superior to those of either or both of the private parties to the issue. He said that there was little if any use in disputing about just or equitable rates of wages. The laborer was entitled to what he could get and the capitalist was entitled to buy labor for as little as he could arrange for it. The main thing was to have quiet and a continued production of goods and services. This was the interest of the people and the object in every arbitration was to ascertain

how far each party to the struggle was prepared to go and what power it had for enforcing its demands by an exhibition of economic strength. After these facts had been ascertained, the task of the arbitrators was easy. One reason why mediation had been so successful was that both sides in a controversy were usually ready to give in, if they could do so without a show of weakening. The intervention of Government arbitrators enabled them to yield gracefully.

Arthur Hale, chairman of the car committee of the American Railway Association, spoke on car efficiency. He described the reasons which had brought his committee into existence, and gave a review of his work, with which the readers of the *Railroad Age Gazette* are familiar. He said that his work was in some respects analogous to the work of railroad commissions in endeavoring to prevent rebates and special privileges. He also exhibited charts showing the trend of conditions in the use of existing cars, and said that if present conditions continue over the country there will be a car shortage in December of this year.

Following Mr. Hale, Dr. C. B. Dudley, president of the bureau for the safe transportation of explosives and other dangerous articles, spoke on the Uniform Rules Governing the Shipment and Carriage of Explosives.

On Thursday the convention discussed the report of the committee on railroad taxes and plans for ascertaining the value of railroad property. The committee favored physical valuation as the only sound basis for taxation. In the discussion Commissioner Clements spoke strongly in favor of a law to provide for physical valuation, basing his argument in part upon the necessity of such knowledge as a foundation for establishing just rates. The same view was advocated by others and the committee report was adopted; but not before some members had clearly shown how little a valuation would aid in fixing reasonable rates.

While there was a general assent to the proposition that there should be such a physical valuation as has been referred to, there was grave dissent from the notion that such knowledge would be of much use in establishing schedules of rates. "If we are to have this valuation," remarked one of the most influential members of the Federal Commission, "It should be done for the true reason which is that of protecting." One member of the Interstate Commerce Commission said: "This is about the most paternalistic proposition that has yet been brought forward in Federal legislation. The advocacy of valuation in order to get at the scale of charge which the roads ought to make is misleading and should not be pursued."

In justice to the members of the committee it should be said that in some degree they recognize the difficulties of the problem. They say:

> "Of all the plans which have been suggested or tried your committee is of the opinion that a general or inventory property tax assessed substantially as upon other property without discrimination is preferable. But for the difficulty of securing a satisfactory valuation it seems probable that no substantial difference should exist as between the treatment of these and other properties. In the hope that an early valuation of these properties will be made by the federal government and, believing that the duplication of this work and the expense incident thereto by both federal and state governments is undesirable, it is not deemed expedient for the convention at this time to make specific recommendations on the subject."

Chairman Martin A. Knapp, of the Interstate Commerce Commission, submitted a report favoring uniform legislation on various regulations for the control of railroads.

Interstate Commerce Commissioner Lane made a report on car service which is given in another column.

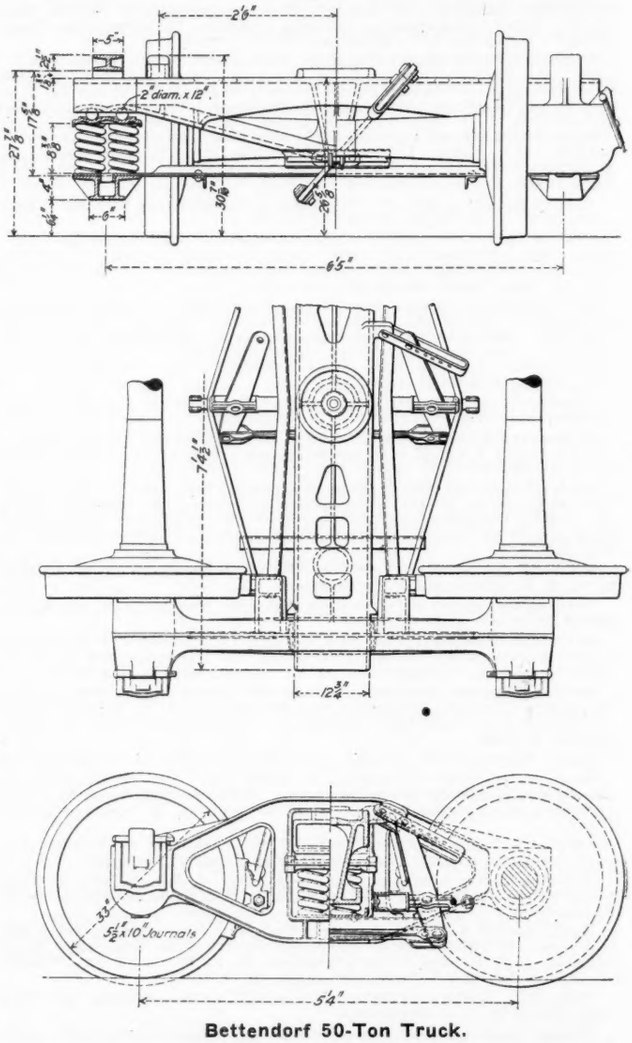
Martin S. Decker of the Public Service Commission of New York, Second District, was elected president of the Association for the ensuing year; R. Hudson Burr, of Florida, first vice-president; Charles F. Staples, of Minnesota, second vice-president, and William H. Connolly, Interstate Commerce Commission, Washington, secretary.

The next meeting will be held at Washington, D. C., October 12, 1909.

50-TON GONDOLA FOR THE BURLINGTON.

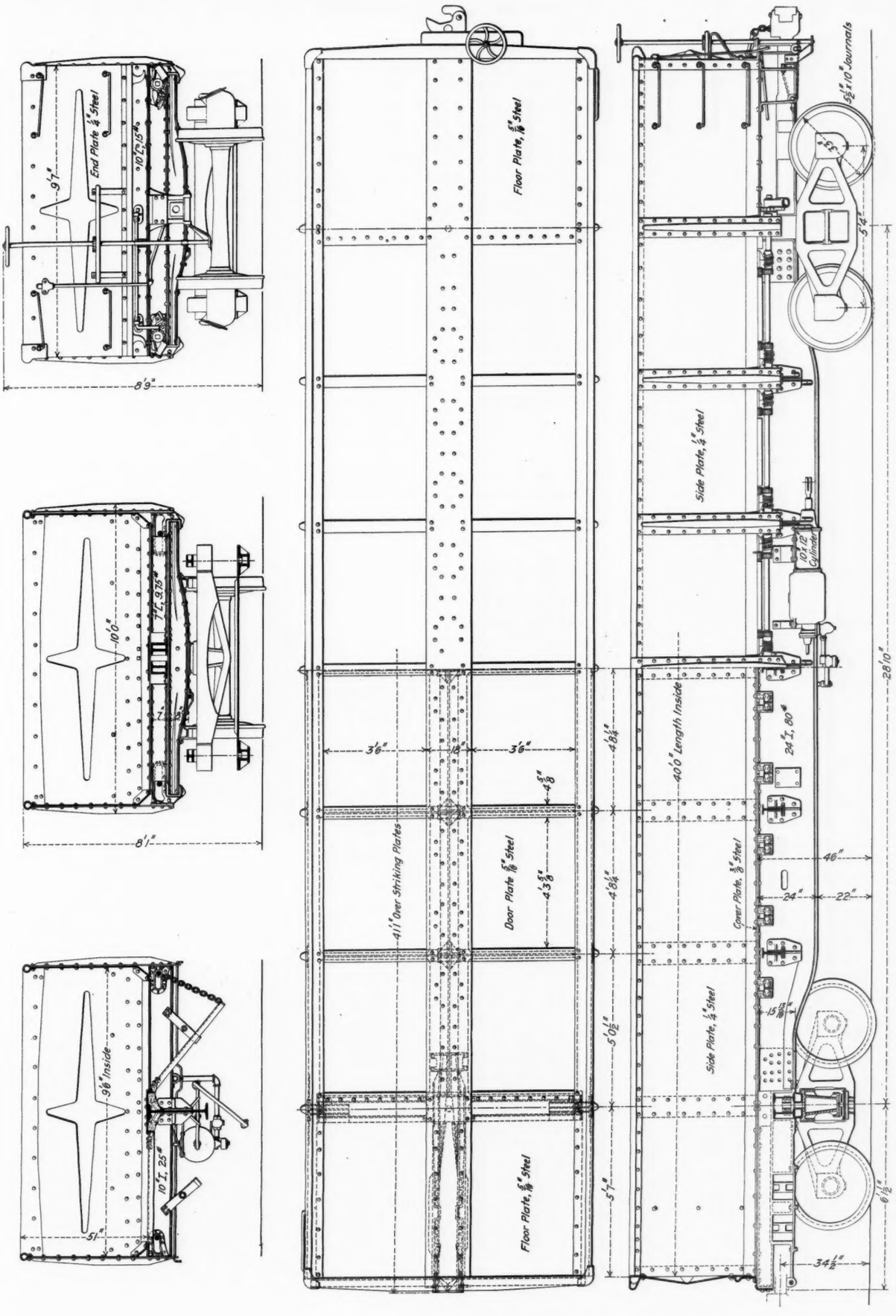
In our issue of June 12, 1908, we showed some photographs of a 50-ton steel gondola car built by the Bettendorf Axle Co., Davenport, Iowa, for the Chicago, Burlington & Quincy. There were 1,000 of these cars built, and one of them was exhibited at Atlantic City during the Master Car Builders' convention. The design of this car is so different from ordinary construction and so generally interesting that it is worth while to show also the drawings.

The car body is 9 ft. 6 in. wide, 51 in. high and 40 ft. long, inside. It is arranged with drop bottoms between the trucks and these are operated by winding chains and a shaft 2¼ in. in diameter. The doors are made of $\frac{5}{16}$-in. steel, flanged and



Bettendorf 50-Ton Truck.

secured to the center sill by malleable iron hinges. Steel hangers riveted to the needle beams catch the doors and relieve the winding chains of strain when the load is dumped. The dumping mechanism is the creeping-shaft type and is protected from injury by the bottom flange of the side sheet. A unique feature of the design is the use of a single center sill, which is made up of a 24-in., 80-lb. I-beam, and an 18-in. x ⅜-in. top cover plate. The I-beam extends between the bolsters, the web being cut out at each end and the bottom flange thrown up to reduce the depth at the ends from 24 in. to 15$\frac{7}{16}$ in. The 18-in. cover plate is extended to the end of the car, but from the body bolster to the end of the car the deep I-beam is replaced by steel castings with draft lugs, which form the draft sills. The cross bearers consist of 10-in., 25-lb. I-beams spaced 4 ft. 3⅝ in. apart. The body



Drop Bottom Gondola; Chicago, Burlington & Quincy.

bolster is made in the usual Bettendorf design by slitting or corrugating the webs of the I-beams to reduce the depth at the ends. The side sheet is ¼ in. thick and is neatly finished by being turned to a complete circle at the top and riveted to itself, while the end sheet has the same thickness and is stiffened by a very deep star-shaped corrugation. The trucks are the Bettendorf standard cast steel side frame of the 50-ton type, having the journal boxes cast integral with the side frame, dispensing with arch-bars, columns and plates. This side frame reduces the weight of the trucks per car about 1,000 lbs. and eliminates nearly 200 small pieces per set of trucks. The light weight of the car is 37,800 lbs., and of the trucks, 14,360 lbs.

SIGNAL INDICATIONS AND ASPECTS.*

The report of 1907 was adopted by letter ballot announced in February, 1908. The same report was submitted to the American Railway Engineering and Maintenance of Way Association by its Signal Committee No. 10 and was adopted practically without dissent at the annual meeting of March, 1908. The report has also been submitted to the American Railway Association, but up to August 1, 1908, no action has been taken by that body.

The 1907 report contains a list of signal indications, which is reasonably complete, and contains the essential and practicable indications. The work of the committee this year has been the development of aspects for the several indications.

In view of the action taken at its meetings during the period from 1904 to 1908, and, after a prolonged discussion of signal practice and signal aspects in Pittsburg, December, 1907, your committee was of the opinion that the best progress in the development of aspects would be made if this subject was handled by a sub-committee of three members. In accordance with this feeling, a sub-committee, consisting of M. H. Hovey, chairman; Azel Ames and Frank Rhea, was appointed and instructed to obtain from each member of the general committee his scheme of aspects, review the several schemes, and submit a report. This report was submitted at Buffalo, May, 1908.

In the work of the sub-committee on aspects and the discussion of the same at the Buffalo meeting, it was found desirable to change the arrangement and wording of the indications appearing in Exhibit No. 1 of the 1907 report above referred to. The sub-committee was, therefore, instructed to revise this exhibit. * * * In addition to the revision of Exhibit 1 by the sub-committee, revisions of this exhibit were also submitted by two other members of the committee. After a very full discussion, Exhibit 102, included in this report, was adopted by the committee * * * In the 1907 report it was the conclusion of the committee "that, in a system of signaling, the aspects should primarily serve to indicate what is required of the engineman in the control of his train, and secondarily should provide for the giving of certain additional useful information, limited by the reasonable practicability of displaying the necessary aspects and the added burden upon

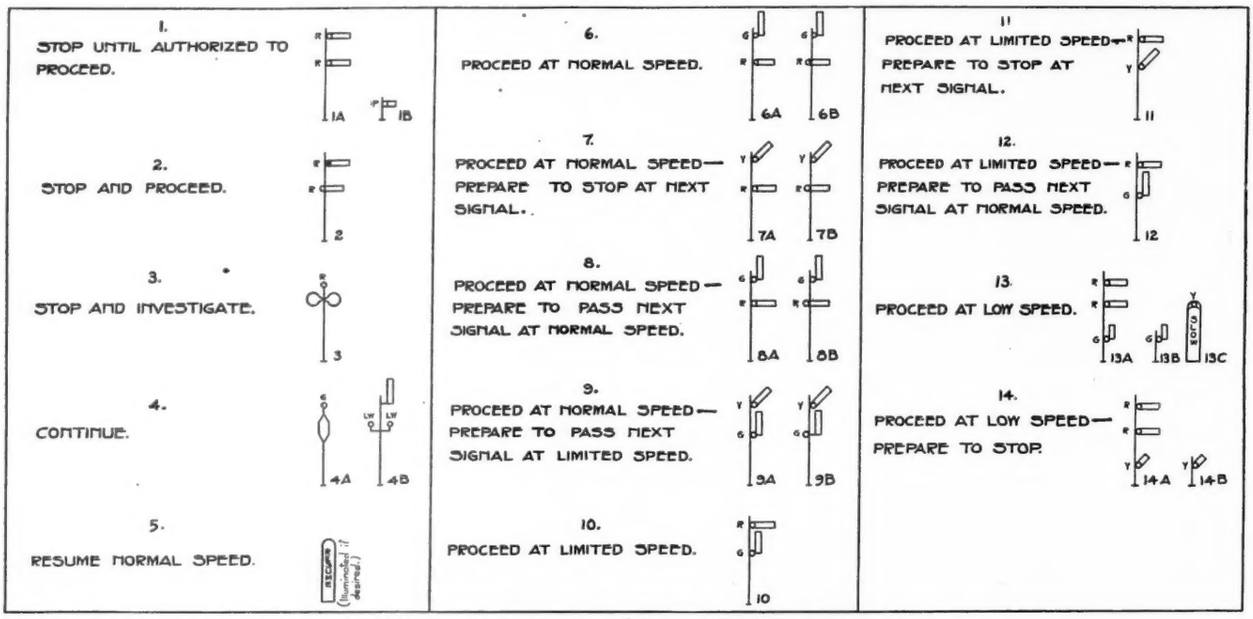


Exhibit Number 104; Report on Signaling Practice.

*Report of the Committee on Signaling Practice to the Railway Signal Association, Washington, October 14.

COMMITTEE ON SIGNALING PRACTICE, RAILWAY SIGNAL ASSOCIATION—EXHIBIT NO. 102.

Primary System.

Basic diagram.

Control
- Immediate control
  - Stop.
  - Proceed
    - Continue.
    - Resume normal speed.
    - Proceed at normal speed.
    - Proceed at limited speed
    - Proceed at low speed.
- Future control
  - A. Prepare to stop at next signal.
  - B. Prepare to pass next signal at normal speed.
  - C. Prepare to pass next signal at limited speed.
  - D. Prepare to pass next signal at low speed.

Indications.

- Stop...
  1. Stop until authorized to proceed.
  2. Stop and proceed
  3. Stop and investigate.
- Proceed
  4. Continue.
  5. Resume normal speed.
  6. Proceed at normal speed.
  7. Proceed at normal speed—prepare to stop at next signal..... = 6 + A
  8. Proceed at normal speed—prepare to pass next signal at normal speed.... = 6 + B
  9. Proceed at normal speed—prepare to pass next signal at limited speed.... = 6 + C
  10. Proceed at limited speed.
  11. Proceed at limited speed—prepare to stop at next signal..... = 10 + A
  12. Proceed at limited speed—prepare to pass next signal at normal speed... = 10 + B
  13. Proceed at low speed.
  14. Proceed at low speed—prepare to stop.

Indications eliminated as unnecessary.... 6 + D, 10 + C, 10 + D, 13 + B, 13 + C, 13 + D

Secondary system—Indications

15. There are orders for you.(31)
16. There are orders for you.(19)
17. Take siding here.
18. Take siding at next station.
19. Proceed—block occupied.
20. Stop for passengers.
21. There are no passengers for you.

the engineman's memory that will result from the use of many aspects."

It should be held in mind that the basis of the proposed uniform system of signaling included in the 1907 report, is *the control of the train by the engineman.*

Upon a close analysis, it was found that Exhibit No. 1 had not been developed strictly in accordance with the basis and conclusions immediately preceding. The basis of the proposed system had been disregarded to a certain extent, in grouping and wording the indications. Exhibit No. 102 will be found to agree with the basis and conclusions of the 1907 report. The immediate work of this committee is then, to provide logical, practicable and consistent aspects for the indications of this exhibit. Your committee has been able to reach a decision as to the aspects for the *primary* indications, and submits them herewith, in Exhibit No. 104.

Your committee has not been able to decide upon the aspects for the secondary indications, but has this matter now under consideration. At the Detroit meeting four different series of aspects for these indications were presented by as many members, but your committee was not ready to accept any one of the four. It is the committee's plan to compare the four series, and any further that may be presented, very carefully and invite full discussion by all members before conclusions are attempted. A sub-committee, composed of Messrs. Stevens, Rhea and Mock, has been appointed to develop and present a consistent series of aspects for the secondary indications at the next meeting of the committee.

Your committee has been handicapped to a considerable extent in its work by the very unfortunate illness of the chairman, and desires that, except as requested above, this report be accepted as a progress report only.

A. H. Rudd, chairman; L. R. Clausen, vice-chairman; Azel Ames, Jr., C. C. Anthony, H. S. Balliet, J. C. Mock, F. P. Patenall, J. A. Peabody, T. S. Stevens, Frank Rhea, M. H. Hovey, H. H. Temple, H. S. Cable, C. A. Christofferson.

THE STATES AS REGULATORS OF FREIGHT CAR SERVICE AND DEMURRAGE.*

During the present year practically all American railroads have been able to furnish transportation facilities within a reasonable time after application from their shippers. This change from the extreme car shortage of 1906-7 is due partly to increased facilities on the part of the carriers, partly to more efficient use of facilities, and partly to the recent business depression. The facts that the total box-car surplus has practically disappeared in New England, slight shortages even having developed on some roads in that region; that in the Northwest the movement of grain has drawn into service practically all grain box cars available in that territory; that the coal-car situation in the Northwest shows few roads reporting an actual surplus and a number arranging to secure cars from Eastern and Southern lines, make the questions of car supply and car distribution of great importance to those who will be called upon by shippers for relief in case a widespread car shortage should be coincident with the return of business prosperity, as seems highly probable.

As questions involving discrimination are most important when the relations between carriers and shippers are under consideration, the problems of car distribution should have first consideration. These problems do not arise except in times when transportation facilities prove unequal to the demands of shippers. At such times complaints are frequent that some shipper is receiving less than his proportionate share of available equipment. These complaints have given rise to a number of proceedings before the Interstate Commerce Commission as well as to a number of cases before the courts. The decisions in these cases now form a fairly compact body of law, and the net results may be summarized as follows:

(1) The carrier is under a legal duty to furnish cars to shippers upon reasonable request therefor.

(2) All cars on the carrier's tracks—with the possible exception of the carrier's own fuel cars—must be regarded as part of its commercial equipment, distributable among shippers without discrimination.

(3) In time of car shortage the requirements of each shipper must be fairly ascertained, and the available car supply prorated accordingly.

(4) Private or individual cars, so called, must be regarded as a part of the carrier's commercial equipment and therefore chargeable against the distributive shares of the shippers using them.

(5) Foreign fuel cars must be regarded as part of the carrier's commercial equipment and chargeable against the distributive shares of the mines using them.

(6) The decisions are not harmonious with respect to the status of the carreir's own fuel cars, but the United States Circuit Court of Appeals for the Fourth Circuit and the Interstate Commerce Commission have ruled that these cars must be regarded as part of the carrier's commercial equipment and chargeable against the distributive shares of the mines to which they are assigned.

(7) The courts are not agreed as to the proper basis for rating the capacity of a mine for purposes of car distribution. The weight of judicial opinion appears to be in favor of a physical capacity basis. The Interstate Commerce Commission has expressed its disapproval of a straight physical capacity system of rating, but has not as yet undertaken to prescribe a substitute.

It is the legal duty of carriers to furnish sufficient facilities with which to transact the business of all shippers. The efforts of the carriers and the efforts of governmental authorities must finally be directed to securing a complete fulfillment of this duty by the carriers. It will not do to rest content with an adjustment of the difficulties caused by failure of the carriers to do their full duty. Carriers should be required to supply themselves with adequate equipment to serve the business and industry of the country. In so far as this equipment is withheld from its true function of transportation both railroads and shippers should be required to adapt their methods to the public interest.

Mr. Lane then went on to give a graphic description of the freight car situation and the experiences of the railroads during the past two years. Continuing, he said:

It is to the interest of shippers that many concessions made by the railroads in the way of free time for cars should be withdrawn. The individual shipper who succeeds in using a coal car as a warehouse for 10 or 15 days free of charge may profit thereby, but he does so at the expense of other shippers who are entitled to have the use of the car for transportation of their coal. The pressure of the individual shippers to secure additional free time is really directed against the proper use of cars and against the best interests of the shipping public as a whole.

Some state authorities have yielded to this pressure of shippers and by so doing have complicated the transportation problem for shippers of other states. One New England state, for instance, has provided for four days' free time for the loading and unloading of cars. This is double a reasonable allowance and is gained by the shippers of this state at the expense of the car supply of the entire country.

A Middle Western state, through its railroad commission during the past year, has increased the free time and introduced various rules in favor of particular classes of receivers of freight. The net result is that cars in that state are most largely used for warehouses.

Recommendations.—State authorities have no jurisdiction over the demurrage or free time upon interstate shipments. They have full jurisdiction, however, over demurrage and free time upon purely intrastate shipments. This division of jurisdiction over what is practically one mass of equipment will be disadvantageous to both carriers and shippers unless the rules for interstate demurrage and interstate free time and the rules for state demurrage and state free time are made harmonious, and are framed with a view not to securing free storage time for shippers but to securing the largest possible use of railroad equipment as a means of transportation.

* From the report of the Committee on Car Distribution and Car Shortage before the twentieth annual convention of the National Association of Railway Commissioners, at Washington, October 7; signed by Hon. F. K. Lane, Interstate Commerce Commissioner.

It is evident that the public interest requires that car-service rules throughout the North American continent should be harmonious; and, under like conditions, absolutely uniform. The entire body of railroad equipment is part of practically one system of transportation.

The necessity of a concerted movement for uniformity of car service and demurrage rules is shown by the present state of the statute law. The car shortage of 1906-7 resulted in an unusually large number of statutes designed to regulate car service. Twenty-five states enacted car-service laws. Twenty of these provided for reciprocal demurrage, as follows: Alabama, Colorado, Indiana, Kansas, Minnesota, Missouri, Arkansas, Georgia, Louisiana, Mississippi, North Dakota, South Carolina, Virginia, Oklahoma, Oregon, North Carolina, South Dakota, Texas, Vermont and Washington.

The provisions of the reciprocal demurrage laws in the above 20 states show little uniformity other than that the shipper is usually obliged to unload or load his cars within a period of 48 or 72 hours, or that a demurrage charge of from $1 to $5 per car for each day of delay on the side of the carrier, the number of cars, the time limit, the demurrage charges, the number of miles per day which the car must move, and the time allowed for delivery, are usually specified, but without uniformity, in the different states. The demurrage charge in the more recent statutes seldom exceeds $5 per car per day. The Texas law which provided for a penalty of $25 if 10 cars were not furnished within six days, or 50 cars within 10 days, was declared unconstitutional as a burden upon interstate commerce beyond the police power of the state. The car-service statutes which do not provide for reciprocal demurrage usually do provide that there shall be a reasonable and fair distribution of cars between applicants.

The public interest requires, however, that freight carriers should serve all shippers alike, no matter in what state such shippers may be located, and no matter whether such shippers are engaged in state commerce or interstate commerce. There is no divided interest, and any rule or arrangement which makes a conflict in interest will be compelled to yield. It is recommended that a resolution in favor of uniform car service and demurrage rules be passed by this association, and that a committee composed of one representative from each state with representation from the Interstate Commerce Commission be appointed to recommend a harmonious system of rules for the entire country, these rules to be applicable on both state and interstate commerce.

HISTORY OF THE STORAGE BATTERY.*

The principle of the storage battery was discovered in 1801 by Gautherot, who experimented with platinum electrodes immersed in a salt solution. Practically nothing was done to develop the principle until 1860, when Gaston Plante, a Frenchman, experimented with a cell consisting of lead strips immersed in dilute sulphuric acid. He discovered that each time the cell was charged and discharged, the amount of current given out on discharge was greater; and further still, that by charging the cell in reverse direction each alternate time, the capacity was rapidly increased. He amplified this process and was able to construct plates having sufficient capacity to make them a commercial possibility. Most of the changes and improvements of the storage battery since this time have been along these lines. Hence Plante is justly considered the inventor of the storage battery.

Plante's method of charge and discharge in reverse direction caused an increased deposit of active material on the plates due to peroxidizing of the raw lead, thus resulting in an increase in capacity. This method of forming active material from the raw lead was slow and difficult and led to the experiments of Camille A. Faure who in 1881 patented a process of making storage batteries by covering the lead surface with lead oxide paste instead of forming the lead electrochemically as in the Plante process. One charge only was then required to put the plates in condition to produce their final capacity. In the United States, Charles F. Brush developed simultaneously with Faure the same process, so that in this country Brush is considered the inventor and his patents here controlled the process.

All lead storage batteries are to-day produced by one or both of these processes, so that they are of the Plante type, the Faure type, or a combination of both types, in which case one plate, usually the positive, is Plante, and the other Faure. Storage battery practice of to-day has therefore evolved through continuous mechanical and chemical improvements from the plates originally made by Plante and Faure.

The commercial use of storage batteries in this country on a large scale began about the year 1893. From this time on, storage batteries came into greater use, the most noticeable applications at first being in connection with isolated electric plants, Edison lighting systems, and electric street railways.

In 1896 the Edison Electric Illuminating Co., of Boston, installed a battery of 8,000 amperes. This was the first big step in the use of storage batteries on an extremely large scale. Since then most of the larger Edison plants throughout the country have installed enormous batteries so that at the present date, there are 165 such plants operating, aggregating 215,000 k.w. hours. The use of large batteries in isolated plants and street railway plants has developed simultaneously so that there are now in operation approximately 1,100, aggregating 316,000 k.w. hours.

The most prominent installation of batteries to date is that of the New York Central & Hudson River Railroad, which is now operating or installing 2,692 cells in nine batteries, aggregating 60,000 h.p. hours at the regulating rate in connection with the electrification of the steam road in New York City and vicinity.

The extensive use of storage batteries in connection with signal work on steam roads is practically confined to the past ten years. In 1898 storage cells were installed on the Pennsylvania west of Pittsburgh, these cells charging from gravity cells and discharging upon the signal circuits. It is a matter of interest to note that many of these original cells are still in service.

In 1902 the Pennsylvania installed at Paoli a complete storage battery system and charging plant. The cells were located in the semaphore bases and charged from a circuit running from a centrally located plant over a wire running to each end of the division. The installation probably represents the first large installation of this character.

Both of these systems involve the use of batteries permanently located at operating points—the current for charging being brought to the batteries. This method seems to be almost universal on the eastern roads. In the west, however, not only is this method operated, but also portable storage batteries are used on a large scale, the batteries being removed at fixed intervals, to the central charging plant, recharged and returned to the operating points.

In 1900 the Southern Pacific used storage batteries of the portable type in connection with automatics. At this time a Plante type portable battery was used. This battery was of considerable weight but was the standard at that time.

There are now in service about 60,000 cells of portable batteries for signal work, used principally on western railroads.

The use of storage batteries for signal work gained very little importance for several years after their initial use. It was in 1903 that they came into general use and since that time have increased at the rate of approximately 100 per cent. per year, up to 1907, when little increase was made.

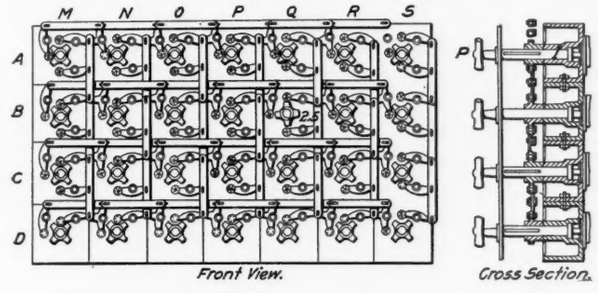
In 1899 storage batteries of 3,000 watt hours were installed; in 1900, 60,000 watt hours. Following this the years are as follows: 1901, 90,000 watt hours; 1902, 150,000 watt hours; 1903, 625,000 watt hours; 1904, 1,150,000 watt hours; 1905, 2,200,000 watt hours; 1906, 4,700,000 watt hours; 1907, 5,000,000 watt hours.

*Committee Report, Railway Signal Association.

THE "UNIVERSAL AUTO-COMBINER."

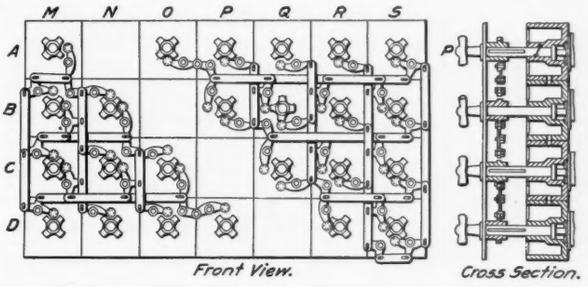
The M.D.M. auto combiner is the name applied to a power-interlocking apparatus, in experimental use on the Northern Railroad of France, employing route levers exclusively. That is to say, one lever throws all the switches for a given route and then clears the signal. Although the following description presupposes a pneumatic plant, the system can be applied equally well to an electric or an electro-pneumatic machine.

To illustrate the application of the apparatus to a typical case consider the diagram of tracks and signals shown in Fig. 3. In the figure, four main tracks are designated by the letters A, B, C, D, and the seven station tracks by the letters M, N, O, P, Q, R, S. The interlocking machine in the cabin



1 1a

Geographical Interlocking.



1b 1c

Diagonal Interlocking.

is connected by conduits to the motor for each signal and to the motor for each switch (four conduits for each switch, two for operation and two for the check return or indication). These conduits may thus connect a single piece of apparatus with the cabin by the most direct route possible as they do not pass through any intermediate apparatus. In the cabin the levers are grouped in the controlling apparatus in successive tiers forming columns or files and rows intersecting each other perpendicularly (Fig. 2). Each row corresponds to one of the tracks A, B, C, D, at one end of the plant and each vertical column or file corresponds to one of the tracks M, N, O, etc., at the other end. In each compartment, at the intersection of a row and a file, there is a place for a lever, which is the one which must be manipulated for a route beginning on the track indicated on the file and terminating on the track indicated on the row, or vice versa. Thus can be found at a glance the proper lever for any route. If the lever is absent from any compartment it indicates that the route is not possible, or is not permitted (in either direction) between the points indicated on the row and the file.

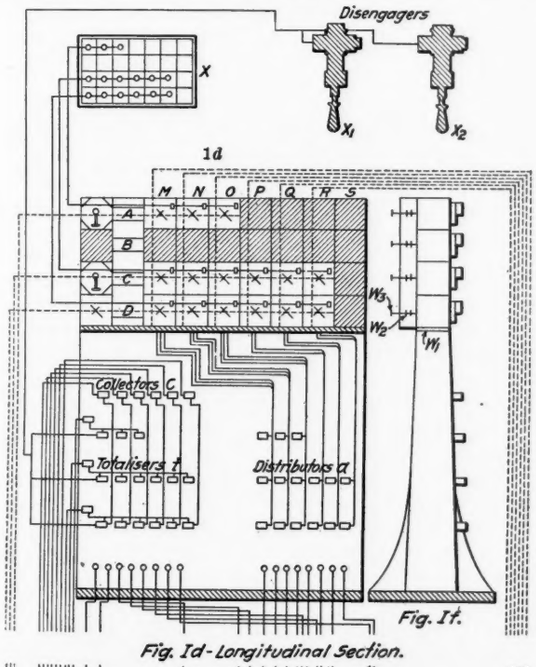


Fig. 1d-Longitudinal Section.

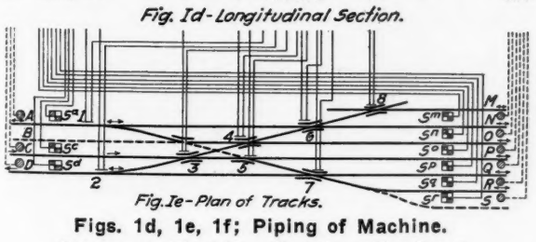


Fig. 1e-Plan of Tracks.

Figs. 1d, 1e, 1f; Piping of Machine.

Reference to Fig. 1d;-x, Check Repeating Board.

In each compartment there are fixed, independently of the lever, two arrows, one directed towards the top of the file and the other towards the end of the row. These arrows show in which direction the lever must be turned, through an angle of 45 deg., to line up a route in the desired direction. If, notwithstanding the presence of a lever in a compartment, one of the arrows is missing, it shows that the route between the two points in question is arranged for use in one direction only, that for which the arrow indicates. The signalman, therefore, has constantly before him, in a striking manner, the physiognomy of his station with regard to the train movements which can be carried out.

The lever frame is of very small dimensions, about 19 in. x 42 in. for a plant like the one illustrated in Fig. 3. When a lever is manipulated (Fig. 3) a sector C, fitted to its end, raises a valve V or V', which sends, through conduit m or m', the motive fluid to the "distributor" d, corresponding to it. This distributor distributes the fluid to the switch motors to be operated. After having acted, the fluid returns to a "totalizer" in order to reach, at last, the governing signal for the route.

The frame of the auto combiner (Fig. 1f) consists of three distinct planes W1, W2, W3. Plane W1 consists of rectangular blocks corresponding to the compartments and joined to each other so as to form a metallic wall, constituting a support to the whole apparatus. Intermediate plane W2 contains the interlocking apparatus. Front plane W3 forms the face of the machine. The handle P, of the lever which projects from the front of the frame, carries an index which is brought towards the row or file, according to the direction of the movement which it is desired to make. Compartments which contain no levers are nevertheless fitted up with interlocking, for a purpose which will be presently explained. As a result, whatever alterations may be made in the arrangement of tracks, the frame will remain as it is except for the addition of levers or their removal as may be necessary to provide for new routes. Such additions or removals can be made in a very short space of time. New compartments need be added only when the number of tracks is increased. Such additions also require but a fraction of the time necessary to accomplish the changes on the track.

Fig. 3 illustrates the piping for one route, that from D to O,

or vice versa (Lever 4. 3, Fig. 2). There is only one double controlling conduit m and m', conveying the fluid for the operation of these switches, although in this case there are three switches concerned, viz., 2, left; 3, left; and 4, right. The two branches of this controlling conduit communicate in a distributing chamber with a distributor d. There is a distinct distributor for each route, and this distributor communicates with the switch motors for the desired position of the points concerned, and with these only. Consequently the three switches of the route in question are thrown simultaneously.

But switch 3, in its position to the left occurs not only in the route D to or from O, but also in the routes D to or from M and to or from N. The distributors 4.1 and 4.2, therefore communicate also with the operating conduit for switch 3. The motive fluid sent by the distributor of lever 4.3 into the conduit 3.1 cannot pass through the distributors 4.1 and 4.2 to the other switches controlled by the latter, as the arrangement of the distributors is such as to allow the fluid to pass in one direction only. Fig. 11 shows the ball valves used to accomplish this result. It should be noted that the switches have no fixed normal or reversed positions, but act with the lever only in one of its extreme positions. That is to say, when the lever is put normal the switches remain motionless in the position that they are then in, and do not move until a second lever is reversed or the same lever reversed in the opposite direction.

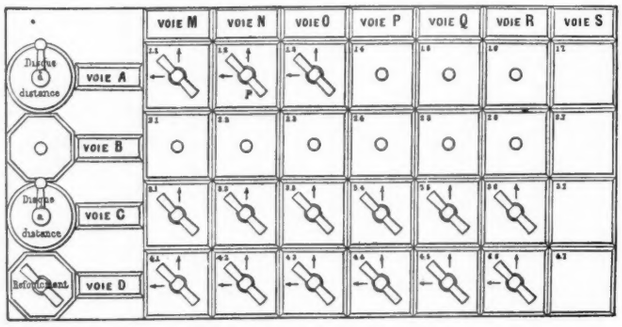


Fig. 2—Interlocking Machine.

Note.—*Voie means track; Distance disque = distant signal; Refoulement = backing-out signal.*

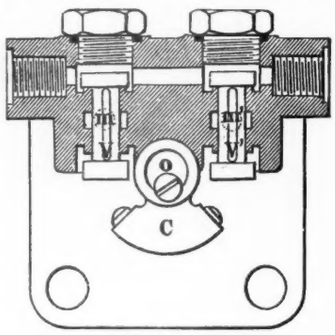


Fig. 4—Starting Valve.

The check returns from each switch return simultaneously and not successively (thereby saving time) to the totalizer *t*, in the cabin. There the individual check returns combine to operate a set of valves in order to allow fluid from the main reservoir to pass to the governing signal and clear it.

Fig. 12 shows the totalizer. Its operation is as follows: The check return coming from each switch raises one of the valves Va, that one corresponding to the switch in question. When all are raised the fluid from the main reservoir can pass to the signal. Valve Vs, called the "signal selecting" valve, must also be raised, by pressure from the starting valve *V*, Fig. 3, coming through *u*. If, while the signal is clear, any switch in the route should become deranged, its check return conduit would be so set as to communicate with the atmosphere causing its valve, *Va* in the totalizer, to drop, thus cutting off pressure from the main reservoir and opening a way of escape for the fluid in the conduit *n* leading to the signal. This would cause the signal to assume the stop position.

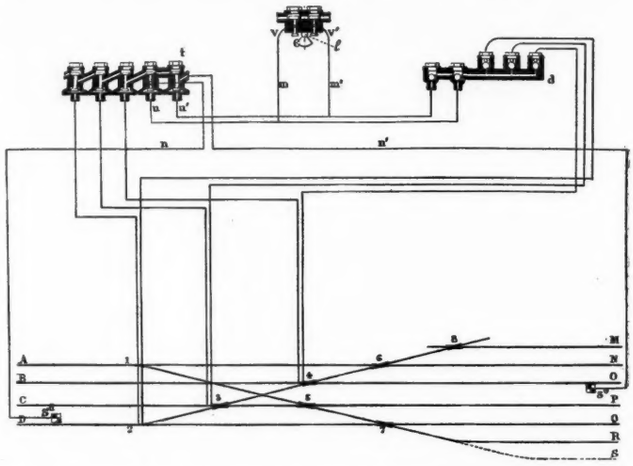


Fig. 3—Diagram of Lever 4-3 and Connections (Route D-O.).

The inverted valve *Vi*, in the totalizer, is connected to a disengager (Fig. 13), which is situated, for example, at the train director's desk. When the handle *h* of this disengager is horizontal (as shown) its valve *Va* is raised and sends pressure underneath the diaphragm of valve *Vi* in the totalizer. This valve then intercepts the passage from the main reservoir to the totalizer, so that even if all the valves *Va* should be raised, pressure could not pass to the signal motor. When the handle *h* of the disengager is vertical, however, *Vi* drops and the fluid can pass. As the same signal may control several routes there is provided in the cabin a "collector."

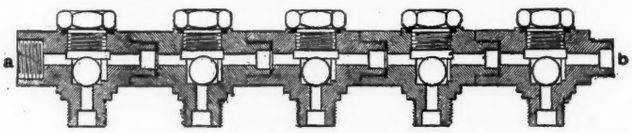


Fig. 5. Collector.

Fig. 14, to which are connected all the totalizers for those routes.

All distributors, totalizers and collectors are made from interchangeable units screwed into each other to the required number for any case. From this it will be seen that it is a simple matter to modify the apparatus in the cabin to conform to any changes in the arrangement of tracks.

All the levers are interlocked with each other so as to render it impossible to line up two or more conflicting routes at the same time. The interlocking, if effected by the ordinary means, would involve a large number of parts, occupying much space beyond the surface of the frame. But in this machine the interlocking is contained within the frame itself

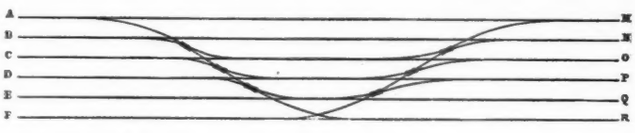


Fig. 6.

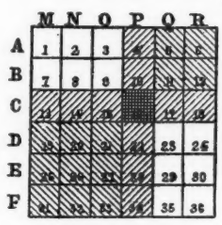


Fig. 7.

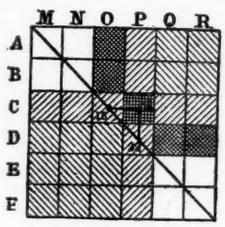


Fig. 8.

so as to form a complete whole of interchangeable parts which can be adapted, modified, or removed, in a few minutes if necessary. The laws governing the system of interlocking used may be understood by considering a layout of tracks as shown in Fig. 6. The frame in the cabin would have the appearance indicated in Fig. 7. Suppose that the route C to or from P is to be lined up. The lever for this route is situated at the

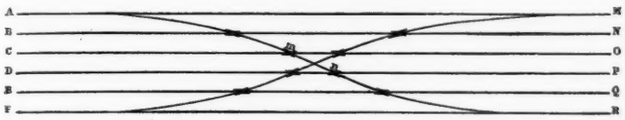


Fig. 9.

intersection of row C and file P, that is, lever 16. When this lever is manipulated it must lock all the levers of row C and all those of file P, as two movements converging from C towards P or from P towards C could not be permitted to take place simultaneously. Moreover, when the route C to or from P is lined up it should be impossible to line up any route such as B to or from Q, or E to or from N, which would intersect the former at any point. All these conflicting routes have their corresponding levers in the northeast and southwest quarters cut off by the cross through 16. The corresponding compartments are indicated by hatch lines in Fig. 7. The arrangement of interlocking derived from this simple law is called "geographical" interlocking. This will be always required whatever the arrangement of the tracks. This sort of interlocking is all that is required for each lever in the plant shown in Fig. 6. Geographical interlocking is provided for all lever compartments throughout the frame whether a lever is present or not. This facilitates changes in the number or position of levers. Considering now a layout such as that shown in Fig. 9 the geographical interlocking indicated by the hatch lines in Fig. 7 remains as before but is no longer sufficient. For, routes A to or from O and B to or from O are no longer compatible with the route C to or from P as they have the point *m* in common. Similarly the routes D to or from Q and D to or from R have, in common, the point *n*. It is therefore necessary to add to the geographical interlocking of lever 16, with reference to the route C to or from P the interlocking of the levers of the compartments marked with double hatch lines in Fig. 8. This is the same result as would be obtained from the geographical interlocking if levers 15 and 22, which are at the points of intersection of the diagonal of the board with the ordinates for the lever in question were manipulated simultaneously (Fig. 8). Consequently, in the case of single crossovers the geographical interlocking is not sufficient except in the case of levers situated on the diagonal of the frame. Respecting any other lever, a supplementary system must exist to bring into play the interlocking at the same time of the two levers which are situated in its projection on the diagonal of the frame. This supplementary system is called "simple diagonal" interlocking. It requires one plane only, parallel to the plane of the geographical interlocking.

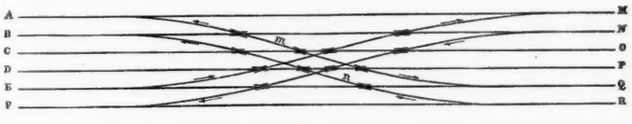


Fig. 10.

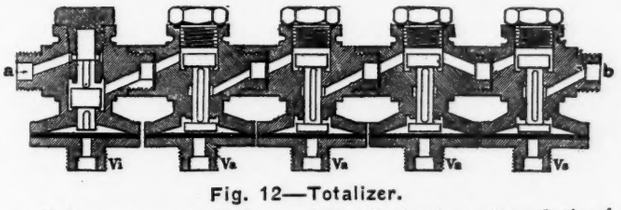


Fig. 12—Totalizer.

a, Main pressure conduit; b, cumulative check return n towards signal 8d; Vi, disengager; Va, Va, Va, switch check returns to 2g, 3g, and 4g; Vs, pressure conduit u from starting valve.

It may happen, for example, in the case of double crossovers in both directions, that the direction of traffic over any particular route has an influence on the interlocking. Thus in Fig. 10 traffic is supposed to be allowed only in one given direction, indicated by the arrows, on any track. Therefore the routes A to O and B to O taking in the crossover *m*, of the double crossover, are incompatible with the route C to P which requires the crossover. On the other hand, they are compatible with the reverse movement P to C, which takes the crossover *n*. Now the routes C to P and P to C, having the same terminations, are controlled by the same lever (16, Figs. 7 and 8), and are determined by the direction of revolution of the lever. Likewise, routes Q to D and D to R do not require the interlocking of C to P, whereas R to D and D to Q do require it. Therefore the diagonal interlocking in this case does or does not apply according to the respective direction of revolution of the levers concerned.

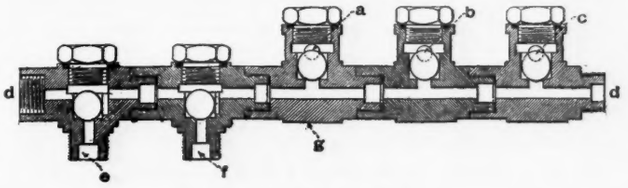


Fig. 11—Distributer.

a, b, c, switches working; d, d, plugs; e, starting valve, excluding down train, V; f, starting valve, excluding up train, V; g, switches available for use in both directions.

Lastly, owing to local conditions, certain levers require interlocking which is not provided for by any of the preceding laws. Such interlocking is called "local interlocking." It may be accomplished by special connections between the levers concerned, thus forming a third plane in the interlocking compartment of the frame. Figs. 1, 1a, 1b, 1c, show the geographical and diagonal interlocking for a typical plant. It is assumed that lever 2.5, corresponding to a potential route B to or from Q, has been manipulated.

It should be noted that with a system of route levers more levers may be required than with an ordinary interlocking plant. This, however, is not objectionable, as the end sought is a minimum number of lever operations rather than a minimum number of levers.

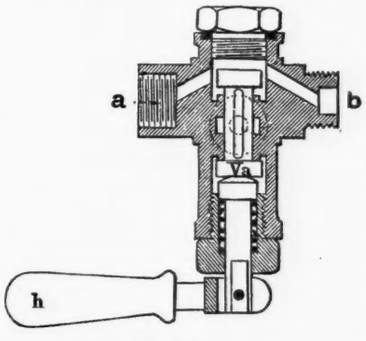


Fig. 13—Disengager.

a, Main pressure; b, conduit to totalizer.

Summing up briefly: The interlocking machine consists of a number of levers, so grouped that the lever for any route is at the intersection of the file and row corresponding to the initial point and the termination of the route in question. The direction for which the signals may be cleared is determined by the direction in which the lever is revolved. Owing to the nature of the route levers and the method of their arrangement in the machine, the mechanical interlocking will be the same in all cases, except for slight local peculiarities. These local conditions can be provided for by arranging a separate set of interlocking parts in a plane distinct from that occupied by the geographical interlocking. If it is borne in mind that with this machine conflicting *routes* must

lock each other and not *functions*, and that the routes are geometrically grouped, it will be easy to understand the principle governing the geographical and diagonal interlocking.

When a lever is turned, pressure is admitted to the distributor for that route and from the distributor passes to all the switches in the route. If any of the switches are not set right for the route the air acts on their motors, and they move to the proper position; if a switch is already properly set, it does not move. Connected to each switch point is a valve, which, when the switch is set for a route, and pressure applied, admits air from the switch operating main to a check return main leading to one of the valves of the totalizer for the route in question. This air, coming from the switch operating main through the check return pipe, raises its totalizer valve and keeps it raised as long as the route lever is reversed. When all the valves in a route totalizer are raised (there is one for each switch, and one operated direct from the starting valve) they open a path for air from the main reservoir to the collector for the governing signal. The collector consists of a chamber connecting with all the totalizers, whose routes are governed by the signal in question. Air can enter from any of the totalizers, but can escape only to the signal, as ball valves are provided in each connection. From the collector the air passes to the signal motor and clears the signal. Should any switch become deranged, the valve connected to its point would open the check return pipe to the atmosphere. This would cause the totalizer valve corresponding to the switch in question to drop, thereby opening the signal operating pipe to atmosphere and the signal would assume the stop position. All parts are interchangeable and made on the multiple unit principle, so that changes can be rapidly and easily effected.

The M.D.M. auto-combiner is made by the Société de Constructions Mecaniques "L'Aster," of Paris, and is represented in England by the Aster Engineering Co., Wembley.

AUTOMATIC STOPS AND CAB SIGNALS.*

A letter was published in the technical journals asking those interested to send to the committee descriptions of their devices, but only a few specifications were received and the recommendations of this committee have been based upon the knowledge and experience of the members rather than from consideration of descriptions which have been submitted.

Automatic stops were probably thought of and invented shortly after the introduction of the air-brake. A number of patents have been issued for automatic stop and cab signal devices. Many of the devices are so much alike that a decision of a court would be required to determine the particular merit or invention, which each patent is assumed to possess. A majority of the designs show the inventor to be ignorant of the conditions under which a device of the kind must be used. Comparatively few of the devices which have been patented have been tried, and this committee is not aware that any of these have passed the experimental stage and are in regular use on a surface road in the United States.

Automatic stopping devices are in successful use on the Boston Elevated, Chicago Elevated, New York Elevated, New York Subway and the Hudson Tunnel Roads. On these roads, snow and ice do not collect in sufficient quantity to interfere with the working of the apparatus and the road clearances are ample for the construction used. The results have shown the automatic stop to be a valuable safeguard and to have prevented a number of collisions that might have resulted in a loss of life.

The automatic stop and cab signal devices which have been given the most extended trial in the United States are the Miller cab signal, the Kinsman automatic stop, and the Rowell-Potter safety stop. Descriptions of these devices may be found in the technical journals.*

In England and on the Continent, cab signals are in use on several roads, there being a need of these on account of the dense fogs, and the unsatisfactory service and large expenditure required for fogmen. No attempt has been made to use a train-control device in connection with the cab signal, as the discipline is such that operating officials do not believe the use of the stop to be advisable or necessary. So successful have the cab signal devices been, that the Board of Trade of England, at the recommendation of Col. Yorke, have allowed roads using an approved form of cab signal to dispense with the distant signal.

The cab signal systems, as used in England, are of the intermittant contact rail type and similar to a number that have been tried in this country. A full description of the Raven Cab Signal, which is used on the North-Eastern Road, is published in the *Railroad Gazette* of February 14 and 21, 1908. From the trials made on American roads, it is evident that devices of the type used in England cannot be made to work in this country on account of ice and snow forming on the contact rails sufficiently to prevent a contact being made between the part on the engine and the part fastened to the track.

Automatic stops and cab signals may be divided into four general classes based upon the method used in transmitting to the engine or moving train the impulse necessary to operate the automatic stop and give a signal indication in the cab. These with their various subdivisions are as follows:

- Mechanical Trips.
  - Overhead.
  - Ground.
- Insulated Engine Parts.
- Contact Rails.
  - Continuous.
  - Intermittent.
- Inductive.
  - Alternating Current.
  - Hertzian Waves.

Mechanical Trips; Overhead Arrangement.—Devices of this type are most generally arranged to transmit to the moving train the operating impulse to apply the automatic stop by means of a hanging arm or weight arranged to strike a valve or handle placed on the top of the cab or car and apply the air, in case the signal should be passed when in the stop position.

These systems must of necessity be arranged for the hanging arm or weight to come within the maximum clearance line, and in such position would be apt to strike, with probably fatal results, a man riding on the top of a car. The absence of the arm will result in a failure to stop a train when a signal which is indicating stop is run by. Up to the present time, as understood by the committee, these devices do not conform to several of what they regard as essential requirements for a safe and reliable automatic stop and cab signal system. These requirements have been given at the end of this report and the overhead arrangement of mechanical trip automatic stopping devices do not comply with Nos. 1, 2, 3, 4, 6, 7 and 12.

Mechanical Trips; Ground Arrangement.—Devices of this type are arranged with a movable arm or inclined plane, which when in the operating position is made to come in contact with parts suitably located on the moving train and cause the brakes to be applied, when the train runs by a signal that is indicating stop.

The difficulty met with in operating devices of this type is that the parts on the ground or those on the engine must extend inside of or beyond the permissible clearance lines, in which position they are likely to be broken or knocked out of place, for the parts placed on the ground and for the parts on the train are likely to be hit by objects other than the engaging arm, and the brakes be applied when they should

*Report of Committee No. 6, Railway Signal Association.

*Miller Cab Signal, *Railroad Gazette*, pages 128, 172, 219, 206 and 207, year 1902.
Kinsman Automatic Stop, *Railroad Gazette*, page 400, June 8, 1894; *Railway and Engineering Review*, page 211, March 14, 1908.
Rowell-Potter Safety Stop. *Railway and Engineering Review*, page 65, November 2, 1895; page 2, January 6, 1900; page 199, March 15, 1902. *Railroad Gazette*, page 547, 1894; page 378, 1902.

not. Ice and snow seriously interfere with the operation of devices of this kind, and these systems, so far as the committee is aware, do not at present meet requirements Nos. 1, 2, 3, 4 and 7.

Insulated Engine Parts.—With these systems it is usual to insulate one truck from the other of the engine or car, insulate an engine from its tender or, insulate one wheel from the other by means of a split axle or insulated wheel center. Pressed fiber is the material by which this insulation is most generally accomplished. With any of the above mentioned arrangements it is necessary that the indication be conveyed to the moving train during the interval of time in which the insulated part is passing over a short insulated section of rail or an insulated joint in the track. The operating impulse is, therefore, momentary and is not continuous.

The principal difficulty met with in systems of this kind is to properly construct and maintain the insulation of the engine parts and to insure that the parts on the moving train will operate properly in the short interval of time available. These systems, it has been found, do not conform to essential requirements Nos. 1, 2, 3 and 12, as recommended by the committee.

Contact Rails; Continuous Type.—Devices of this type are arranged to conduct the operating signal impulse to the moving train by means of a shoe attached to the train making contact with a third rail placed alongside of the main rail, between the main rails, or above, or on the side of the train.

The difficulty experienced with devices of this type is to secure a continuous contact on the third rail, for, unless this is done, the device operates and the brakes are applied when there is an opening in the third rail, irrespective of whether or not the operating conditions make it necessary or desirable that the train brakes be applied. The continuous type of contact rail system, as at present understood by the committee, does not conform to requirements Nos. 1, 2, 3, 4 and 12.

Contact Rails; Intermittent Type.—With these systems the contact is usually of moderate length and is placed at a point where it is desired to convey the operating signal impulse to the moving train. These points are at the commencement of a block, or where a home or dwarf signal is placed. The indication given on the train is continued from the time a train passes one contact to the passing of the next contact, or to one where the indication is changed. The principal difficulty to be overcome in the development and use of devices of this type is to insure that the indication will be received on the moving train, and when received will not be improperly changed before the next contact point is reached. These systems, as far as developed, do not fully meet requirements Nos. 1, 2, 3, 4, 7 and 12.

Inductive; Alternating-Current Type.—The committee is not aware that apparatus of this type has been tried. As described, the system is quite similar to the intermittent contact rail scheme, except that the operating impulse is conveyed to the moving train by induction, a coil of wire attached to the track acting on a suitably arranged coil placed on the train. The arrangement can be made to keep within the clearance lines and seems to be capable of successful development provided the necessary alternating current is available at the many points where same will be required. Requirements Nos. 1 and 2 do not appear to be complied with by systems of this type, of which the committee has knowledge.

Inductive; Hertzian Wave Type.—This type of apparatus makes use of a generating device placed on a train or at a fixed point from which the Hertzian waves are sent out, preferably in the direction in which it is desired to give the indication. A collector of suitable form and arrangement is placed on the train or point at which an indication is to be received and the proper Hertzian waves are supposed to be collected and actuate the apparatus to give an indication. The principal difficulty with apparatus of this type is in selecting the particular train or fixed point which is to receive the intended indication and to provide protection for a train when there is a failure of the wave-generating apparatus. It is understood by the committee that these systems do not comply with the following requirements for safe and reliable working: Nos. 1, 2, 3 and 6.

RECOMMENDATIONS.

Up to the present time descriptions and drawing of automatic stop and cab signal devices referred to this committee have not included those which seem to be the best and the most practicable. Your committee is not in a position to, and does not think it advisable, to recommend for trial any type of cab signal or automatic stop device with which it is familiar, believing that demonstrations of the practical workings of these systems should be made by the patentee or the manufacturer, or under the auspices of the Block Signal and Train Control Board of the Interstate Commerce Commission.

That those interested in the design and manufacture of automatic stop and cab signal devices for use on surface railroads may know of the operating conditions under which these systems will be used, and the requirements as to safe and reliable working which must be met in order that these devices may have the approval of this association, your committee submits for adoption the following requisites of installation to which automatic stop and cab signal systems must conform, to be considered safe and reliable in operation:

Requisites of Installation.—1. Apparatus and circuits so constructed that a failure of any essential part will cause the display of a stop signal indication and also the working of the automatic stopping device to prevent one or all trains from entering the block in which the failure has occurred, if the speed of the train is in excess of five miles per hour.

Note: To comply with this requirement, it is practically necessary that circuits be arranged with power supply at one end and controlled relay or function at the other end of each circuit.

2. The train control feature must be applicable for use with the absolute or the permissive block system.

With either system the release of the stopping device must be within the control of the engineman or trainman, but only after the speed of the train has been reduced to five miles per hour or less.

3. The automatic stopping device must be operative only in the direction of traffic, except in connection with signals governing reverse movements.

4. The system must be operative under all weather conditions and at any speed in excess of five miles per hour.

5. The system must be adaptable for use with a block system using track circuits.

6. The system must give protection against a broken rail, the ends of which have separated, or where a rail or section of a rail has been removed from the track.

7. The parts on the moving train must not extend beyond the maximum clearance lines and the parts on the ground must not extend within the maximum clearance lines, except for a space of two (2) feet above the top of the rail, within which distance the parts must clear the maximum equipment line.

8. An overlap equal to the braking distance for the maximum permissible speed must be provided.

9. Emergency application of the brakes should be made only when a home or dwarf signal has been run by, when indicating stop. If the system is arranged to cause an application of the brakes when a train passes a distant signal that is indicating caution, the application of the brakes must not occur if the home signal is indicating proceed, or if the speed of the train is being controlled so that the train will be stopped before passing the home signal.

10. The circuits must be arranged to allow two or more engines to be used with one train, or to allow one train to push another train without having the automatic stop applied at each home signal, or to require the speed to be reduced

to five miles per hour when passing a home signal that is indicating proceed.

11. Insulated wheels and axles must not be required as a means of transmitting the operating signal impulse to parts on the moving train.

12. The automatic stop must be adaptable for use with electric traction systems, using direct or alternating current for train operation.

13. The automatic stop and cab signal should be considered only as adjuncts to a fixed signal system.

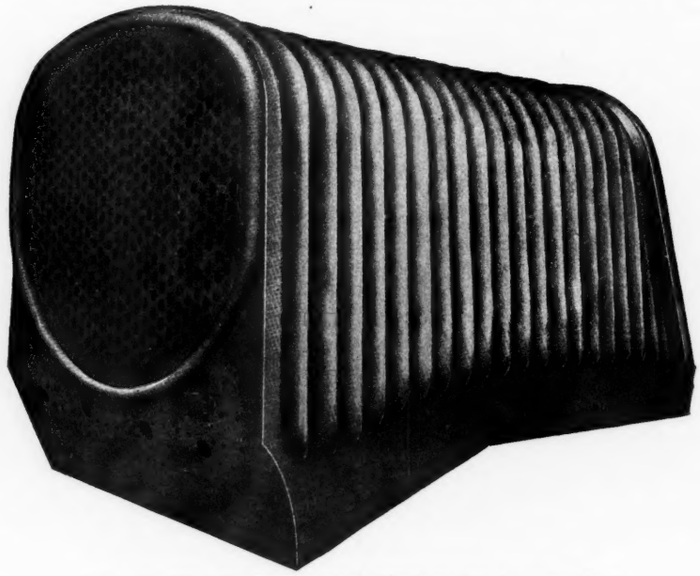
Note: This is on account of the impossibility of properly checking the work of the engineman if a cab signal or automatic stop is used without a fixed signal and also from the necessity of informing the engineman of the exact commencement of the block and the point at which the indication received in the cab shall become effective.

W. H. Elliott, chairman; A. R. Raymer, vice-chairman; E. M. Weaver, G. D. Fowle, J. V. Young, G. N. MacDougald, W. E. Bullard, G. H. Dryden, E. C. Graham, J. A. Beoddy, W. McCrafton, H. J. Foale, D. M. Case, E. E. Mack, Wm. Hiles, A. C. Holden, J. R. Decker, G. W. Hulshizer.

It will be remembered that one of the great difficulties in building the Congo Railroad was that of obtaining labor. The natives for the most part refused to work on the railroad, and men were brought from China and the distant parts of the world. One of the engineers who was engaged in its construction last year inspected the line, which was opened through July 1, 1898, and finds the disposition of the natives changed. Now they form the larger part of the 2,000 employees, serving as trackmen, firemen, brakemen and laborers, and a few as foremen, telephonists, and even enginemen. They engage for one or two years, usually a little band coming from the same village; and when one band's engagement is over, it usually sends another from the same village, where there is great competition to secure the succession. The native enginemen are looked up to as great men, and the whole village turns out to do them honor when they take trains through it.

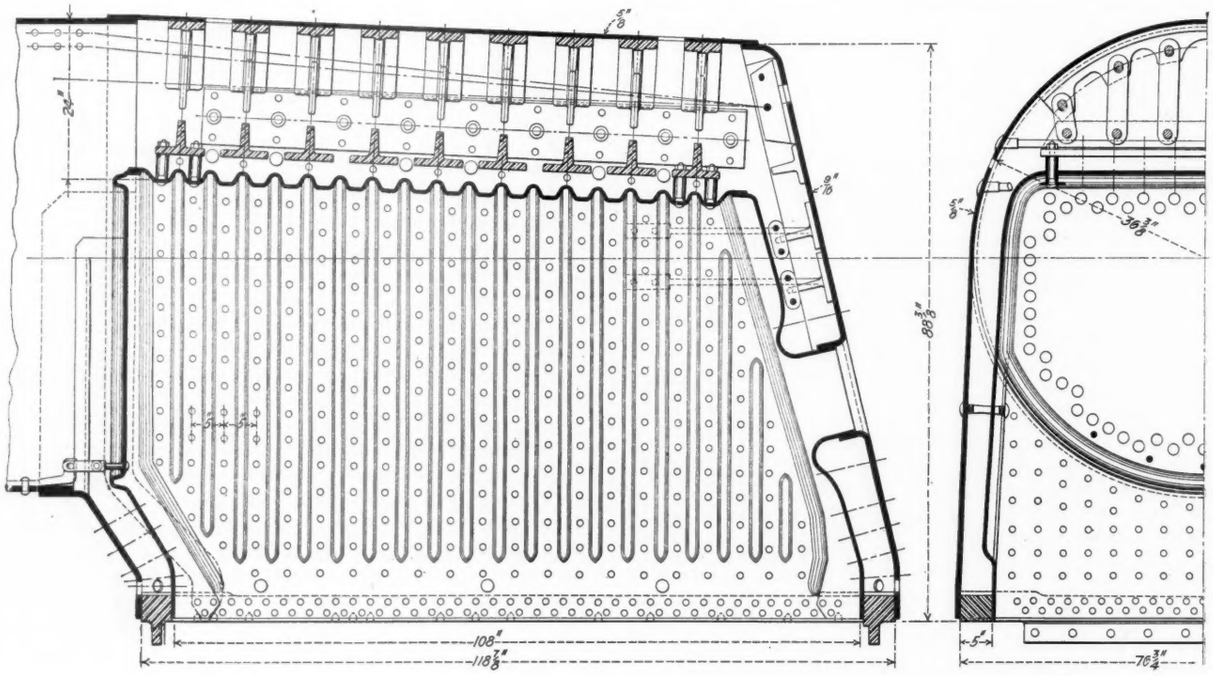
WM. H. WOOD'S CORRUGATED FIREBOX AND FLEXIBLE TUBE PLATES FOR LOCOMOTIVE BOILERS.

Various methods for overcoming the rigidity of the straight firebox sheet and plain staybolts in locomotive boilers have been designed. Prominent among them was the Vanderbilt corrugated firebox, which was circular in cross section and which dispensed with staybolts entirely, but which was limited in grate area and firebox volume. Flexible staybolts are, at this time, extensively used and various attempts have been made to relieve the expansion and contraction of the side sheets by slight, shallow flanging, such as could be done with the ordinary hand tools in locomotive boiler shops.



Wm. H. Wood's Corrugated Firebox for Locomotives.

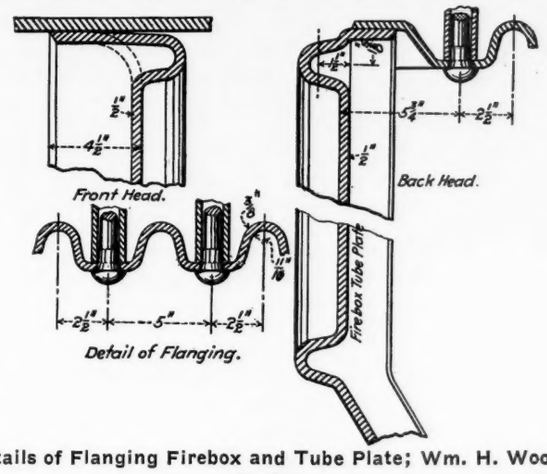
A radical departure from all these methods is found in the Wood corrugated firebox, with the ogee on each end, encircling the crown, as well as the sides, which is here illustrated. Fireboxes and tube plates of this design are being made for the New York Central, to be applied to three large consolida-



Sections Through Firebox; Wm. H. Wood's Patent Design, as Applied on the Union Pacific.

tion boilers. These boilers are 80 in. in diameter, having 458 tubes 15 ft. 6 in. long, and one of these boilers, the first with flexible fireboxes and tube plates in this order, will be shipped this month. The design has also been worked out for an Atlantic boiler for the Union Pacific with 70 in. shell; also for a Pennsylvania Railroad standard locomotive boiler arranged with the outside shell for the Belpaire firebox. The general plan and details of the fire box for the Union Pacific are here illustrated.

It will be noticed in the detailed drawing that the pitch of the corrugations of the firebox sheets is 5 in., and there is a flat portion between each corrugation to which the regular staybolts and crown bolts are applied. The firebox sheet is ⅜ in. thick, the same as is ordinarily used with flat plates. The tube sheet is ½ in. thick, and is flanged with a deep recess around the edge, as shown in detail drawing, but the riveting edge is carried up to the highest part of the ogees extending beyond the corrugations in the crown sheet, so that the same number of flues can be used as with the plain tube sheet in the ordinary firebox. In the design for the Union Pacific boiler the back head of the firebox is also flanged with a wide sweep at the fire door opening, (O'Connor's patent) so as to insure greater flexibility. The flexible back head and tube plate can be used with the regular form of plain firebox with advantage, if ogeed on sides and crown as in corrugated box, for the purpose of preventing leaky tubes



Details of Flanging Firebox and Tube Plate; Wm. H. Wood's Design.

and relieving the tension on staybolts. In each boiler the corrugations are carried over the crown portion and down the sides within one staybolt space of the mud-ring; the regular mud-ring and water space are employed.

The advantages claimed for the improved firebox are: The heating surface is increased over 30 per cent.; the strength is increased over 50 per cent.; from 300 to 350 less staybolts will be required than in the ordinary firebox; the flexibility of the corrugated back head and tube plate allows the flues to contract and expand and prevents the beading being pulled out of position on the tube plate. Vertical expansion of the tube plate is also provided for and the tension on the mud-ring near the tube plate is considerably released. The contraction and expansion of the box is divided equally between the staybolts.

The manufacture of a locomotive firebox with three sides completely corrugated and ogeed at each end encircling the crown, as well as the sides, is a very difficult performance, and it has been accomplished by Mr. Wood, as the result of his large experience in the manufacture and use of hydraulic flanging machinery for locomotive boiler shops. The experiments with the three corrugated boilers on the New York Central will be watched with interest, for if the claims of the manufacturer were fully sustained they would lead to material modification of present boiler practice.

THE LEGAL, ECONOMIC AND ACCOUNTING PRINCIPLES INVOLVED IN THE JUDICIAL DETERMINATION OF RAILROAD PASSENGER RATES.*

BY MAURICE H. ROBINSON,
Professor of Industry and Transportation at the University of Illinois.

(Continued.)

The remaining passenger expenses could then be divided between the intrastate and the interstate traffic in proportion to the actual passenger mileage made by each, allowing such additional per cent. to the intrastate traffic as may be found reasonable. At the present stage of railroad accounting no scientific basis for this difference in cost has been found. Moreover so long as these two classes of the passenger business continue to be conducted by the same companies over the same road and in the same trains, an exact determination is impossible. Under such circumstances the solution of the question will always depend upon the method chosen for the division of the common expenses, which must always continue to be in the final analysis a matter of personal or social judgment. If then we assume that the passenger mile in intrastate traffic costs ten per cent. more than the passenger mile in interstate business and then use this assumption for correcting the passenger mileage actually made in the intrastate traffic, we arbitrarily decide, without any direct proof, that the railroads may properly be allowed to charge a somewhat higher rate per mile in the intrastate than in the interstate business. A consideration of the above conditions, which are typical of the whole process of apportionment of the common expenses, leads to the inevitable conclusion that however far the refinements of accounting may yet be carried, the element of personal judgment must continue to enter at almost every step in the process and thus constitute an important factor in the final results. These results will in the long run be more scientific, not because wholly divorced from the element of personal judgment, but because the problem is separated into its elements and thus the judgment is enabled to act upon particular rather than upon general propositions.

V.

Application of the methods above described to a particular case may serve not only to illustrate the principles invoived in the separation of joint expenses but aiso to show the effect of the several methods upon the apparent cost of transportation. At the hearing before the Wisconsin Commission in regard to the maximum passenger fare case, the Chicago, Milwaukee & St. Paul Railway Company presented elaborate tables showing in an unusually complete and comprehensive way the detailed operating expenses for the year ending June 30, 1905. A part of the expenses were actually separated. The remaining items were arbitrarily allocated by the company, using various methods, but chiefly either train mileage or gross earnings. The gross earnings and the train mileage for the state and for the passenger and freight departments were, of course, easily determined. Furthermore, an unusually thorough investigation had been made by the state tax commission into the valuation of the railroad property in the state for the same year. Consequently the necessary data for applying the various methods of apportionment in a specific case are unusually complete and especially adapted for the purpose.

The total operating expenses of the railroad company for the year 1905, according to the report, were $30,041,747.99. Of this amount the state of Wisconsin was charged with $9,517,337.55 or 31.68 per cent. The amount apportioned to the state was considered too large for the following reasons: (1) Wisconsin's proportion of the revenue train mileage was only 28.24 per cent.,[59] (2) only 24.96 per cent. of the total road mileage was located in the state;[60] and (3) the value of the

*Reprinted by kind permission of the *Yale Review*.
[59] Report of Commission, p. 123.
[60] *Ibid.*, p. 164.

property located in the state was, according to the valuation made by the tax commission for Wisconsin and by the railroad company for the line, only 25.98 per cent. of the total investment. The commission, using its own methods of allocating common expenses to the state, arrived at the conclusion that the expenses for the state should be reduced to $8,639,652.04 or 28.76 per cent. of the total expenses.[61] Taking the company's figures as a basis for use with the Pennsylvania method for the apportionment of common expenses between the freight and passenger departments and the Wisconsin Commission's apportionment for the use with the Woodlock method, and dividing the common expenses according to the principles of allocation above explained, the results are as follows:

Chicago, Milwaukee & St. Paul Railway Company Earnings and Expenses, State of Wisconsin, 1905.

(1. Pennsylvania R. R. Co. method of apportionment between freight and Passenger.)

	Freight.	Per cent.	Passenger.	Per cent.	Total.
Earnings	$11,048,591.18	=71.80	$4,340,407.97	=28.20	$15,388,999.15
Operation	5,826,528.21		3,690,809.34		9,517,337.55
Taxes & int.[62]	2,638,193.61		1,970,809.91		4,609,003.52
T'l expenses.	$8,464,721.82	=59.3	$5,661,619.25	=40.7	$14,126,341.07
Surplus	$2,583,869.36		—$1,321,211.28[62a]		$1,262,658.08

(2. Chicago, Milwaukee & St. Paul Railway Company Method of Apportionment.)

Earnings	$11,048,591.18	$4,340,407.97	$15,388,999.15
Operation	6,484,011.31	3,033,326.24	9,517,337.55
Taxes & int.	3,307,420.94	1,301,582.58	4,609,003.52
T'l expenses.	$9,791,432.25=69.4	$4,334,908.82=30.6	$14,126,341.07
Surplus	$1,257,158.93	$5,499.15	$1,262,658.08

(3. Woodlock's Method of Apportionment.)

Earnings	$11,048,591.18	$4,340,407.97	$15,388,999.15
Operation	6,442,096.65	2,197,555.44	8,639,652.09
Taxes & int.	3,307,420.94	1,301,582.58	4,609,003.52
T'l expenses.	$9,749,517.59=73.6	$3,499,138.02=26.4	$13,248,655.61
Surplus	$1,299,073.59	$841,269.95	$2,140,343.54

(4. Wisconsin Railroad Commission's Method of Apportionment.)

Earnings	$11,048,591.18	$4,340,407.97	$15,388,999.15
Operation	6,506,677.38	2,132,974.66	8,639,652.04
Taxes & int.	3,307,420.94	1,301,582.58	4,609,003.52
T'l expenses.	$9,814,098.32=74.1	$3,434,557.24=25.9	$13,248,655.56
Surplus.	$1,234,492.86	$905,850.73	$2,140,843.59

Thus the passenger proportion of the total expenses, including taxes and interest, varies from about one-fourth, according to the methods employed by the Wisconsin Commission, to slightly over two-fifths when the train mileage system of the Pennsylvania Railroad Company is used. Accordingly, since the passenger and freight receipts come from separate sources within the state and in the case of the interstate traffic have been separated at the state boundaries in a fairly satisfactory manner, the surplus credited to the passenger and freight department varies with the method of apportionment chosen. Under the train mileage system, the freight traffic appears extraordinarily profitable while the passenger service is conducted at a large annual loss. The method adopted by the Chicago, Milwaukee & St. Paul Company gives results less at variance with those reached by using the accepted principles of cost accounting. The freight service here receives practically all the profits, leaving almost no surplus for the passenger department. The results reached by the Wisconsin Commission are practically the same as those found by applying Woodlock's method of apportionment. In either case, after paying the expenses, including taxes and interest, assigned to the passenger department, there is left, under the three-cent fare, a clear surplus over all costs of a million and a quarter dollars for the freight service and about nine hundred thousand dollars for the passenger.

[61] *Ibid.*, p. 167.

[62] Taxes are the actual amount assessed by the State of Wisconsin and are pro-rated to the freight and passenger departments as other general expenses. The interest allowed is 6 per cent. upon cost of reproduction as determined by the state tax commission and is pro-rated the same way.

[62a] Deficit.

If now we make the final division of expenses, viz., that between the intrastate and the interstate traffic, for the passenger department, using the method[63] adopted by the Wisconsin Railroad Commission we have the following results:

Chicago, Milwaukee & St. Paul Railway Company.
Intrastate Passenger Earnings and Expenses, 1905.

Method.	Earnings.	Expenses.[64]	Surplus.
Penn. R. R.	$1,720,347.75	$2,243,699.71	—$513,351.96[65]
C., M. & St. P. Ry.	1,720,347.75	1,717,924.44	2,423.31
Woodlock	1,720,347.75	1,386,708.40	333,639.35
Wis. R.R. Com'n	1,720,347.75	1,361,115.03	359,232.72

Varying with the methods adopted for the apportionment of the expenses, first among the states and second between the freight and passenger departments, and using the gross earnings method for the division of the total passenger expenses charged to the State, it is found that the Chicago, Milwaukee & St. Paul Railway Company is at the one extreme losing over one-half million dollars annually on its intrastate passenger traffic and on the other receiving a clear income of over $350,000. If the legislature orders a reduction in the maximum passenger fare from three to two cents per mile, as it recently did, and the case is appealed by the railroads to the courts, as it may be, the decision of the judges will in reality be determined when they choose among the several methods of apportioning the joint expenses at each step in the process of separation. If the courts should accept the St. Paul's apportionment to the state of Wisconsin, the revenue train mileage method of dividing common expenses between the passenger and freight departments, and the Wisconsin Railroad Commission's plan of allocating joint passenger expenses to the intrastate traffic, they must necessarily conclude that the intrastate passenger business is now being conducted at a heavy loss and consequently any further reduction in rates by state action would be contrary to the express provisions of the fourteenth amendment to the constitution of the United States. If, on the other hand, they find that the Commission's method of apportionment in each case is based upon sound legal economic and accounting principles, they would approve the order of the Commission reducing the maximum passenger fare for the intrastate traffic to two and one-half cents per mile, but would decide that the reduction made by the legislature was illegal, since a reduction of one cent per mile on the assumption that the traffic might not increase in volume[65a] would lessen the intrastate revenue by $423,035.12,[66] an account considerably larger than the surplus under the three-cent fare.

(To be continued.)

On July 1, 1908, a general advance in passenger rates on the Russian railroads went into effect. The advances on local rates are: First class, 30 per cent.; second class, 20 per cent.; and third class, 10 per cent., with appreciable discounts on long trips.

The new rates from St. Petersburg, via Moscow, are as follows on imperial trains:

To :—	First-class.	Second-class.	Miles.
Shanghai	$210.82	$150.70	7,189
Nagasaki	197.88	135.75	6,553
Vladivostok	169.10	109.00	5,795
Harbin	141.10	95.28	5,312

The rates are payable in rubles (ruble = 51.5 cents), and include place and berth on the Siberian express, two trains per week. The rates by the International trains, one train per week, average about 5 per cent. more than the fares quoted.—*Consular Report.*

[63] It is impossible with the data at our command to pro-rate expenses between the intrastate and interstate passenger business according to the method suggested in the preceding pages. This could be done by any railroad company or by a railroad commission with the aid of a staff of accountants familiar with railroad accounting, but would entail considerable expense. For the protection of the owners of railroad property some such method of apportionment must be adopted provided the courts continue to apply the cost theory as a criterion of the reasonableness of railway rates.

[64] 39.63 per cent. of the expenses apportioned to the passenger department for the state.

[65] Deficit.

[65a] 35 Federal Reporter, 881; 169 U. S., 528.

[66] Report of the Wisconsin Railroad Commission in the maximum passenger rate case, p. 169.

RAILROADS AND EMPLOYEES SHOULD CO-OPERATE.*

Your organization is a membership of workers who travel while they work and burn money while they work. The average mileage that each fireman travels a year is over 25,000 miles and he uses $2,500 worth of fuel. The importance of this will be more clearly illustrated when I say that fuel cost represents over 10 per cent. of the total expenses of railroad operation.

For every mile each fireman travels 10 cents is spent in fuel. This is 7 cents of every dollar earned by the railroads. Of that dollar the employees get 42 cents. The 42 cents to employees and 7 cents for fuel shows where 49 cents out of every dollar taken in by the railroads go. * * *

I shall give you a few comparisons to show what a magnificent future there is for the railroad employees and the general prosperity of the country if we can establish permanent regulations that are mutually fair to the public and the railroads, and all pull as one for best results. Within 10 years the number of firemen in the railroad service has increased 92 per cent. During this period the firemen's annual pay-roll has increased from $23,000,000 to $53,000,000. The railroad mileage of this country last year was 227,000 miles, which is an increase of 24 per cent. in 10 years, during which period there were constructed 44,000 miles. On this basis, within the next 10 years there should be 55,000 new miles of railroad built. In the past 10 years the gross earnings of the railroads have increased 130 per cent. and at this same ratio of increase the gross earnings in 10 years will be $6,000,000,000; as the railway employees receive 42 cents of every dollar earned by the railroads, their pay-roll will have increased from $3,000,000 per day as it was last year, to $7,000,000 per day, or annually to a total of $2,500,000,000. The pay-roll of the firemen alone, which last year was $53,000,000, will amount to $122,000,000 at the end of the next 10 years, if our country is permitted to develop as it should, and as it has for the last 10 years; and the number of firemen will have increased from 70,000 to 160,000 men. * * * We are a happy family and want to continue our freedom of organization as railroad co-workers, and not as uniformed government servants reporting to inexperienced federal authorities and superintendents at Washington.

The business of this country is, with very rare exceptions, conducted upon honest lines. The men who are in charge of large enterprises are, as a rule, honest and faithful. In Wall Street there are men whose business life has been given to supplying their own funds and funds of investors of this country and Europe, who have confidence in them, to build up the railroads of this country. Ninety per cent. of the 105,000 miles of railroad serving the people of that great domain lying west of the Mississippi River has been built by funds furnished by New York bankers. Some of their investments have been profitable; while others have not. They took their chances and have experienced receiverships and foreclosures. On the whole, however, they have made a profit. They were entitled to a profit for supplying the necessary funds to enable the country to grow and its resources to be developed, but one hundred times more profit has been received by the owners of lands, of mines, by merchants and manufacturers in the different commercial and manufacturing centers than the bankers received upon their investments.

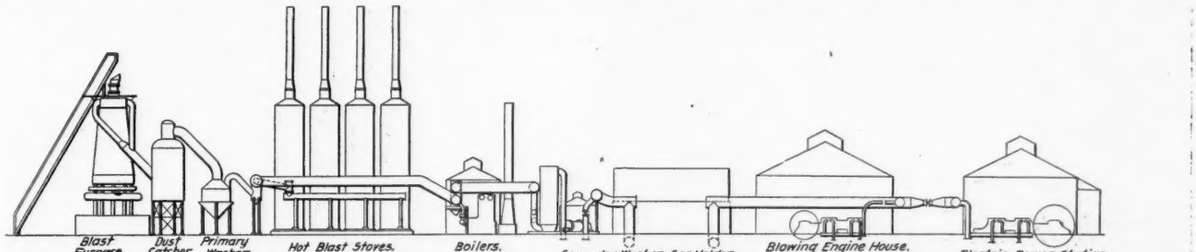
The regulation of the railroads by the government should be fair, but such as will effectively prevent any favoritism or injustice by railroads in their dealings with the public. Any attempt on our part as railroad employees and investors to undertake to create unfair conditions through legislation or otherwise in favor of the railroads against the public would be a serious mistake, and would receive the resentment and condemnation of the public, and properly so.

I am heartily in sympathy with you in your work. I believe organized labor and organized capital can better work together, and the future will so demonstrate. I believe every man who works is entitled to be classed as a working man, and I am still working, and I have worked, as most of you know, in the different departments of railroading. My first railroad work was on a section. From there to the traffic and operating departments until I reached my work of construction. Within the last 12 years I have planned and carried out the construction of more than 5,000 miles of railroad. I am proud of this work. The railroads I have built are now employing 30,000 men. * * * I am not talking to you as a politician.

* From an address by B. F. Yoakum, chairman of the executive committees of the Rock Island-Frisco Lines, delivered before the convention of the Brotherhood of Locomotive Firemen at Columbus, Ohio, September 28.

UTILIZATION OF BLAST FURNACE GAS.

The Indiana Steel Company's great steel plant at Gary, Ind., is nearing completion. Two power plants use for fuel the blast furnace gases. It is here proposed for the first time to use the entire volume of the gas produced for power purposes. Smaller installations of gas engines made by the Allis-Chalmers Co., Milwaukee, Wis., for the Illinois Steel Co. and two of the plants of the Carnegie Steel Co., as well as for other works separate from the United States Steel Corporation, have shown the complete success of the new system. Except for various auxiliary purposes and as a reserve in case the blast furnaces are shut down, steam has no place in the new mills.


Blast Furnace.
8 Blast Furnaces 3600 T. Pig Iron per 24 hrs. Total B.F. Gas produced per hour = 22,450,000 Cu. ft. = 100% Equivalent to 250,000 B.H.P. (in gas engines).
Dust Catcher.
Primary Washer.
Hot Blast Stoves.
30% used here or 6,750,000 cu. ft. per hour.
Boilers.
7.5% used here or 1,700,000 cu. ft. p.h. For spare steam blower, pressure and other pumps, steam for gas prod. heating of buildings etc.
Secondry Washer.
Gas Holder.
2.5% used here and in primary Washers, or 600,000 cu. ft. p.h.
Blowing Engine House.
12.5% used here or 2,800,000 cu. ft. per hour. 2.5% used for auxiliaries for Blast Furnaces themselves (in gas engines) or 800,000 cu. ft. p.h. Total for furnace operation 15% or 3,400,000 cu. ft. p.h.
Electric Power Station.
Remaining 45% available for other purposes. or 10,000,000 cu. ft. p.h. Equivalent to 110,000 B.H.P. (in gas engines) with gas at 90 B.T.U. per cu. ft. and 10,000 B.T.U. per B.H.P. hr. gas consumption.

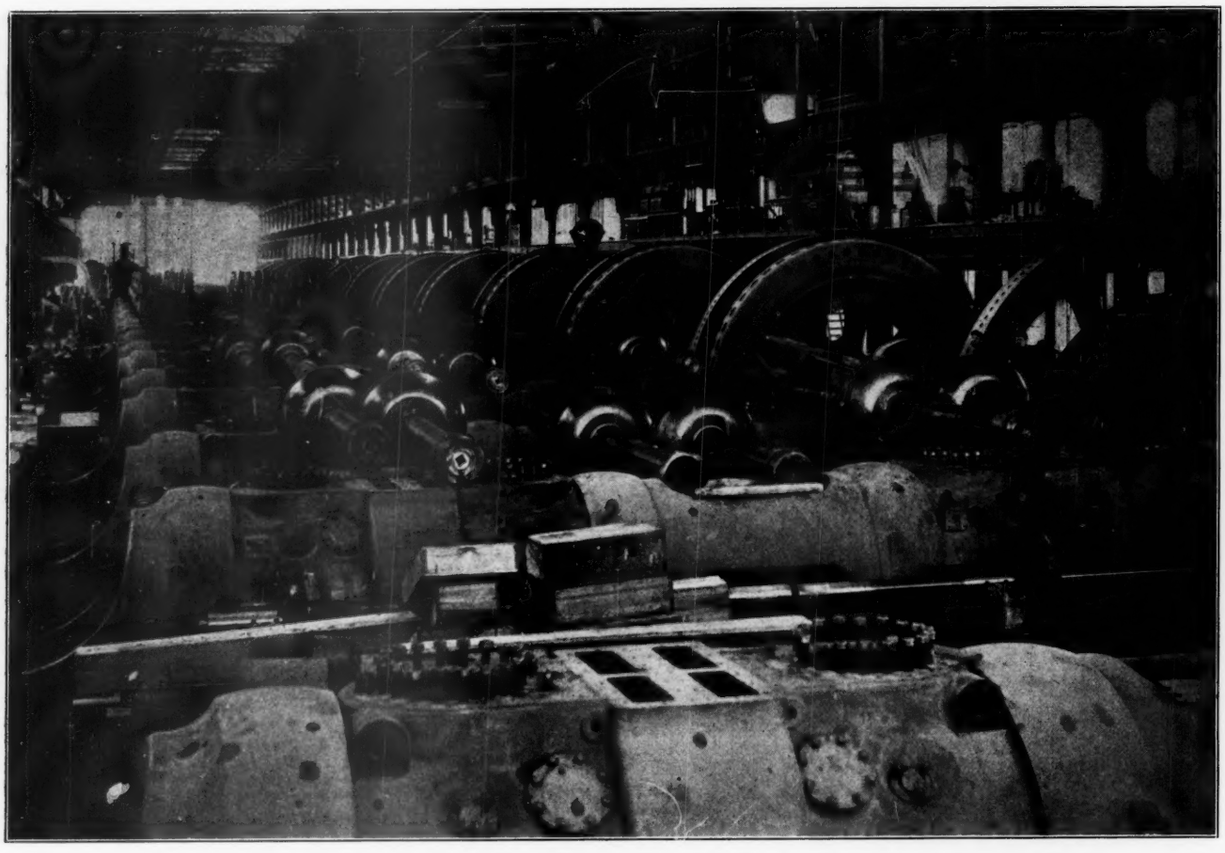
Distribution of Blast Furnace Gas; Gary Plant of the Indiana Steel Company.

The installations mentioned and others made abroad show that, with the utilization of gas engines, batteries of blast furnaces can be depended on to develop enough power, making the entire plant, except for ore, coke and limestone, literally self-contained. At Gary the plan calls for 16 blast furnaces, eight of which are now about completed. The most interesting feature of the system is the link connecting them with the power station and blowing engine houses. This is the gas

cleaning plant, which adjoins the furnaces and stoves.

When the dust-filled gas is blown to the tops of the blast furnaces, it passes from each, through four outlets, into two large pipes, called downcomers, which lead into a reservoir, 30 ft. in diameter and 40 ft. high, called the dry dust catcher. There a considerable part of the impurities settle to the bottom, and the gas passes into another large pipe, which leads upward some distance to give more dust time to drop, and then turns down again, emptying into a supplementary tank, 14 ft. in diameter and 25 ft. high, one of which serves each pair of furnaces. This structure not only provides an additional dust catcher, but also acts as a valve, being divided into two compartments partially filled with water. By increasing the height of the water in either one, the furnace on that side can be cut off as desired, and there will be no back flow of gas from the mains beyond. The two chambers of this tank discharge into a pipe 10 ft. in diameter, which carries the gas against this. Rising to the top the gas passes on into the Thiessen washers, of which there are four to each pair of blast furnaces. In each of these it is led between the wall of a cylinder and a revolving drum carrying a series of paddle-like blades. A stream of water is spread in a film on the surface of the cylinder and the whirling drum throws such impurities as the gas still holds out against the film, where they are caught and held. From these final washers the gas is conveyed under slight pressure to the holders, each of which has 200,000 cu. ft. capacity, from which it goes, as required, to the electric power station and blowing engine houses. The water for the various processes described above is furnished by four large Platt turbine pumps.

Sixteen blast furnaces produce about 44,900,000 cu. ft. of gas per 24 hours, equivalent, when used in gas engines, to 500,000 brake h.p. Of this quantity, about 30 per cent. is taken for heating the stoves, 7½ per cent. is diverted to steam boiler



Partial View of Generating Units; Indiana Steel Company's Plant at Gary.

and remaining impurities into the primary wet washers. There are three of these to each pair of furnaces, and each is big enough to take care of the gas from a single furnace, thus providing a spare washer for use while one is being cleaned or repaired. The primary washers are cylindrical, with cone bottom and cone top, and are about one-third full of water, a proper overflow maintaining the required level. Here the gas and dust are discharged against the surface of the water from pipes with fluted edges, and then escape around these edges into openings from a larger main. At this point a small percentage of the gas is diverted to special furnaces under a battery of Rust boilers used for making steam, and about 30 per cent. is taken for heating the stoves. The remainder continues on to the secondary washers. First of this group are the vertical scrubbers, drums about 14 ft. in diameter and 50 ft. high. A torrent of water cascades down through it, and from near the bottom of the drum the stream of gas comes

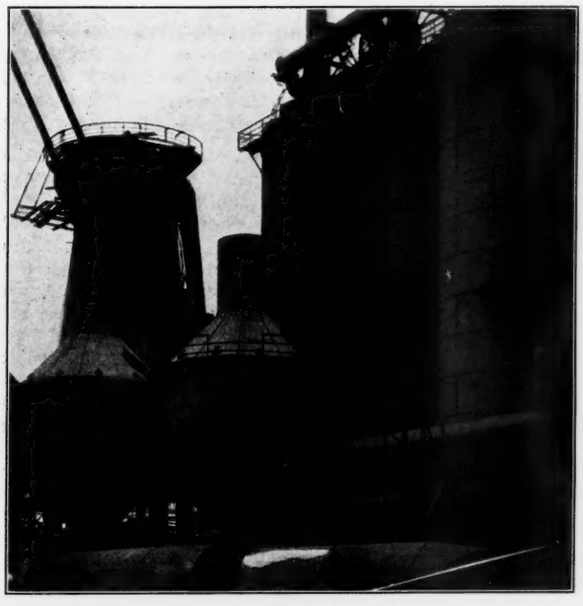
furnaces, 5 per cent. is consumed by various auxiliaries or lost in the process of cleansing, 12½ per cent. runs the gas-engine-driven-blowers, and 45 per cent. supplies the electrical power station.

For the eight furnaces thus far erected, there are two blowing engine houses of construction similar to the power station described below. One is 600 ft. long and 104 ft. wide, and the other is of the same width but only 530 ft. long. The difference is because the first-named house includes a central pumping and hydraulic power plant, equipped mainly by the Snow Steam Pump Works, Buffalo, N. Y. Besides gas engines, each house contains two steam-driven Tod blowers, but when the plant is in full operation these will not be used.

Each of the 16 blowing engines consists of a horizontal, twin-tandem gas engine of 2,500 h.p., having cylinders 42 in. x 54 in., and two direct-driven blowing tubs having a capacity to deliver 30,000 cu. ft. of free air per minute against a pressure

of 18 lbs. per sq. in., and so designed and proportioned that they can be operated at any pressure up to 30 lbs. These blowing tubs are of the Slick type. By using this type, an inlet valve area of 25 per cent. and over is easily attainable, thus insuring that the cylinder will fill completely at any speed at which the engine is able to operate it. The gas and air cylinders are at opposite ends of the engine frame. Eight of these engines were built by the Westinghouse Machine Co. and eight by the Allis-Chalmers Co.

The electric power station, which is 966 ft. long and 105 ft. wide, with 42 bays each 23 ft. wide, is immediately adjacent to the blowing engine houses and between the blast and open hearth furnaces. This places it advantageously for fuel supply and insures minimum lengths of transmission lines to the various departments using electric power. In this central station there are 17 horizontal, twin-tandem, double-acting gas engines, running at 83 r.p.m. Of these, 15 are designed for coupling to alternating current generators and two for direct current generators. The former are 25-cycle, three-phase, 6,600-volt machines, and the latter deliver current at 250 volts. The engines have a rating of 4,000 h.p. and the generators 2,000



Rear of Blast Furnace Group, Showing Primary Washers and Hot Blast Stoves.

k.w., but they are capable of carrying continually 30 per cent. overload. The 17 units were built complete by the Allis-Chalmers Co. These are the largest engines in the world running on blast furnace gas, being almost duplicates of the units built for the Illinois Steel Co., as previously mentioned, which are operated in parallel. The successful working of that plant insured the success of the Gary installation.

The distinctive features of the engines are the simplicity of design, the solidity of construction and the quiet operation. Maximum overloads are handled as easily and with the same freedom from vibration that characterize operation under normal condition; the engines turn their centers as quietly as a slow-running Corliss machine and with apparent indifference to the rapid changes in load which, in steel mill service, they are called on to carry.

While the engines are, as a whole, exceptionally rigid and heavy, the weight is concentrated in the frame cylinders and tie pieces in the direct line of stresses to which an engine of this type is subjected. In the frame is illustrated the principal difference between European and American design. This frame is designed for a side crank in place of the double-throw crank which is the standard practice abroad. The stresses transmitted to the frame in a side-crank engine are very great, but, even in the largest sized gas engines, they are no greater than the builders have for many years successfully provided for in steam engine practice. The engine frames weigh about 90 tons each, and one-half of each frame is buried in the foundation in order to raise the floor line to a point which will make the rods on the valve gear readily accessible.

The floor space occupied by one engine is 70 ft. x 44 ft., and the weight approximates 1,700,000 lbs. The cylinders are 44 in. x 54 in., the crank pins are 20 in. in diameter, the shaft is 30 in. in diameter in the bearing, and the flywheel is 23 ft. in diameter, weighing 200,000 lbs. The pistons and rods are water-cooled, water being introduced at the center and flowing forward to a discharge in the frame for the front piston and backward to a discharge in the tail guide for the rear piston, each piston having its separate supply. The exhaust from the gas engines is conveyed to a tunnel 12 ft. x 9 ft., located immediately outside the building and beneath the ground level. This runs the length of the building and is provided at each end with a stack 9 ft. in diameter and 92 ft. high. The same method of muffling the exhaust is provided for the blowing engine houses.

The power generated will be distributed throughout the works and used to operate the heavy induction-motor-driven rolls, the tilting and feed tables for the various passes, the hot saws, hot and cold pull-ups, hot rolls, transfer tables, straightening and drilling machines, cold saws, elevators, conveyors, pumps and a multitude of machines and mechanical devices auxiliary to the operation of such an enormous plant. Several of the motors built by the General Electric Co. for these works are of 6,000 h.p. each, being designed for driving the rolls, and from this they range in size down to machines of the smallest capacity used to operate switches in the power-house. The problems of control presented by the multitude of motors installed at this plant involve many interesting features, the solution of which was largely intrusted to the engineers of the Cutler-Hammer Manufacturing Co., Milwaukee, Wis., and the automatic devices now installed at Gary represent the most recent developments in electric control as applied to steel mill machinery. The electrical system as a whole is subject to central control at a switchboard operated from a gallery 16 ft. high. This switchboard, which was designed by the Western Electric Co., New York, has the usual complement of instruments of standard types.

To help get maximum economy under heavy fluctuations of load, by utilizing the full value of the generating power of the gas, without regard to the amount of current required at any given time for the operation of the mills, a storage battery installation, furnished by the Electric Storage Battery Co., Philadelphia, Pa., has been housed in a two-story building, 87 ft. x 47 ft., near the power station. The batteries will be kept charged as nearly as possible to their full capacity, to assist in meeting, for a considerable time if need be, any demands for excessive power made on the gas-engine-driven generators. These can, in themselves, be heavily overloaded, but the best power factor is, of course, to be secured at about their rated capacity. The battery also aids in maintaining, at light loads, a constant pull on the generating equipment.

The sub-foundation of the power station, as well as of each blower house, is a solid mass of concrete underlying the entire structure on the level of Lake Michigan and having a depth of 5 ft. Above this are separate foundations for each of the generating and blowing units. The arches forming the roof of the power station have a clear span of 85 ft., providing headroom, at the dome, of 73 ft. above the floor level. The station is served by two 50-ton cranes. The roofing is heavy galvanized corrugated steel. The interior walls for a height of 10 ft. are of white enamel brick, but above that point the surfacing is in red pressed brick. The exterior consists of red building brick.

General News Section.

Fire in the yards of the Kansas City Southern at Pittsburg, Kan., on October 15, destroyed 107 freight cars. The loss is estimated at $65,000.

Two petitions for the electrification of the Chicago terminals of the Illinois Central, said to be signed by 40,000 persons, were presented to the Chicago city council by the Anti-Smoke League on the evening of October 19.

Near Hermosa Junction, Wyo., on Monday 9, last, the caboose of a work train on the Union Pacific was blown off the track by high wind, and fell to the bottom of a steep bank; and 12 workmen, riding inside, were killed. Many others were injured.

Baltimore & Ohio officials have not yet been able to reach any conclusion as to the probable cause of the recent wreck of part of the Havre-de-Grace bridge. A great deal of the bridge material is still in the river, and engineers are making thorough examinations of it as it is taken out.

At Altoona, Pa., telephones have been installed in the homes of 517 trainmen of the Pennsylvania Railroad, and all of the trainmen and yardmen of the Middle division are now called to service by telephone, instead of by messenger, as formerly. Fifteen callers have been appointed to other positions.

The Railroad Commission of Louisiana has ordered the Louisiana Western, the Louisiana East & West, the Colorado Southern, New Orleans & Pacific, and the Chicago, Rock Island & Pacific within 30 days to install and operate interchange track connections between their lines at Eunice, La., the expense to be divided as the lines themselves shall agree.

The surprise tests on the Pennsylvania Railroad during August aggregated 3,255, with 99.25 per cent. of the trains checked perfect. These tests consisted in setting signals at unexpected positions, extinguishing signal lights, placing torpedoes on the track, and causing other unusual conditions. Fourteen divisions reported perfect observance of all block signal tests made, while 15 divisions were perfect in all other tests.

On Friday morning, October 16, all of the electric trains on the New York, New Haven & Hartford, between Woodlawn, N. Y., and Stamford, Conn., 20 miles, were held motionless, because of the withdrawal of the power, in consequence of the expansion of a line wire by unusual solar heat. This wire—a signal wire—sagged so as to cause the burning of a feed wire, and this resulted in the "blowing" of two circuit breakers near the power house.

The Pennsylvania Railroad has been experiencing for some time considerable trouble from employees selling passes to outsiders. When brought to trial recently in Altoona, one employee admitted that he had disposed of twenty-eight passes at different times. Within the past two years the Pennsylvania has brought to trial several employees, who have received heavy sentences in the local courts. The railroad officers say that they are determined to prosecute all such offenders to the full extent of the law.

The Lackawanna will soon have over 400 miles of its lines equipped for train despatching by telephone. The section between Scranton and Binghamton, 62 miles, has been thus worked for two months. The apparatus consists of a despatcher's outfit and a twenty-two station equipment. The selective calling system used is the Gill, the same as that used on the New York Central lines. The Lackawanna has made arrangements with the Western Electric Company to install complete systems for telephone despatching between Binghamton and Syracuse, 79 miles; Binghamton and Utica, 95 miles, and Binghamton and Buffalo, 201 miles.

The Detroit & Mackinac will try to run a continuous farm on its right-of-way in the season of 1909, planting a diversity of crops on each side of the track. The purpose is to show travelers and intending settlers what can be done with the soil and also to prevent the many fires that are started along the railroad by sparks from locomotives when weeds and dry grass are allowed to accumulate. The company will also have a 40-acre model farm at Emery Junction, Mich. An officer of the road writes that the experiment with a continuous farm on the right-of-way was tried some years ago, but so many roots of old stumps were found that the project had to be dropped.

The strike on the Canadian Pacific appears to have been a complete defeat of the shopmen. The strike was settled October 4 after the men had been out nine weeks. They settled on the following terms:

(*a*) That they wire the Government accepting the majority award of the Conciliation Board unconditionally.

(*b*) That the strike be called off separately on Eastern and Western lines.

(*c*) That the Company endeavor to find employment for the men who went out on strike without discrimination.

The men had struck against the award of the Conciliation Board, particularly objecting to dealing separately with the management of the Eastern and the Western lines. Every point contended for by the company was secured and the leaders of the men seem to have been wholly discredited. Public opinion throughout Canada was with the railroad, the leaders of the men having been quite unreasonable in their attitude.

C. S. Clarke, Vice-President; C. H. Middleton, Assistant to the Vice-President, and B. P. Waggener, General Attorney, of the Missouri Pacific, conferred with the Kansas Board of Railroad Commissioners on October 13 regarding betterments to the property of this road in Kansas. Mr. Clarke said that it was intended to put into betterments in Kansas all that traffic conditions would justify. The company, however, was unable to get enough funds from the sale of securities, and all betterments, while present conditions existed, would have to be made out of earnings. The company had authorized an issue of bonds which on the return of good times will be marketable. These bonds would provide for betterments and equipment about $13,000 a mile. It was agreed that Mr. Clarke and Mr. Middleton, accompanied by the railroad commissioners and an engineer employed by the commission, should make an inspection of the entire property of the Missouri Pacific in Kansas. Where it is found to be in a dangerous condition defects will at once be remedied, and the property will be brought to a good condition as fast as financial conditions will permit.

Railroad Employees' and Investors' Association.

At a meeting of the executive committee of the Railroad Employees' and Investors' Association in Chicago on October 16, P. H. Morrissey, Grand Master of the Brotherhood of Railroad Trainmen, was elected president of the organization. Mr. Morrissey will resign as head of the Trainmen's Brotherhood and devote his entire time to the new association. The office of the association will be at 233 Railway Exchange, Chicago. Mr. Morrissey will appoint its secretary. While the original organization embraced only officers of western roads, enough assurances of support have been received to indicate that it will in time include almost all of the important railroads in the United States.

Association of Fuel Agents.

A meeting is to be held in the parlors of the Auditorium Annex Hotel, Chicago, on Friday, November 20, 1908, at 10 a.m., for the purpose of organizing in an association, social and educational, the men engaged in the purchase, distribution, handling and accounting of fuel on the railroads of the United States, Canada and Mexico.

At this meeting, in addition to arranging date and location for the first annual meeting, by-laws and rules governing the association will be adopted, and committees will be appointed

to prepare suitable papers to be read and discussed at the annual meeting. It is proposed to include in this association men employed as purchasing and fuel agents, fuel supervisors, fuel accountants and chief clerks to heads of departments handling fuel. The proper methods of handling, inspecting, weighing, distributing and accounting for fuel, together with the most approved manner of handling coal and oil from cars to engines, will be among the subjects which are to be taken up by the association.

The organization committee is as follows: Chairman, Eugene McAuliffe, General Fuel Agent, Rock Island-Frisco Lines, Chicago; R. L. France, Fuel Agent, Southern Pacific, San Francisco, Cal.; J. R. Rooks, Fuel Agent, Boston & Maine, Boston, Mass.; Thos. Britt, General Fuel Agent, Canadian Pacific, Montreal, Can.; C. H. Macklin, Purchasing Agent, Seaboard Air Line, Portsmouth, Va.; J. H. Hibben, Fuel Agent, Missouri, Kansas & Texas, Parsons, Kan.; S. L. Yerkes, Fuel Agent, Queen & Crescent System, Lexington, Ky.

Association of Railway Superintendents of Bridges and Buildings.

The eighteenth annual convention of the Association of Railway Superintendents of Bridges and Buildings was held at the Arlington Hotel, Washington, D. C., on October 20 to 22 inclusive. The convention was called to order at 10 a.m. and the first address was, "Some Points of Interest in and around New York," by D. W. Lum, Chief Engineer, Maintenance of Way, of the Southern Railway. The following committees have been appointed:

COMMITTEES ON SUBJECTS FOR REPORT AND DISCUSSION.

I. Water-Proofing of Concrete-Covered Steel Floors.—A. F. Miller, Master Carpenter, Pennsylvania Lines West, 38 West Van Buren St., Chicago; Austin Lord Bowman, Bridge Engineer, Cent. of New Jersey, 29 Broadway, New York; A. A. Page, Supr. B. & B., B. & M., Boston, Mass.; I. F. Stern, Bridge Engineer, C. & N.-W., Chicago.

II. Modern Equipment and Tools for Erection of Steel Bridges.—J. Hunciker, C. & N.-W., Chicago; W. H. Wilkinson, Bridge Inspector, Erie, 464 Lyon St., Elmira, N. Y.; G. J. Klumpp, Supr. Bridges, N. Y. C. & H. R., Rochester, N. Y.; B. F. Pickering, Supr Bridges, B. & M., Sanbornville, N. H.; A. E. Killam, General Inspector, Intercolonial Ry., Moncton, N. B.

III. Protection of Structures against Effects of Electric Currents.—C. W. Richey, Master Carpenter, Penn., Pittsburgh, Pa.; Walter A. Rogers, Consulting Engineer, Ellsworth Bldg., 355 Dearborn street, Chicago; A. D. Schindler, General Manager, Northern Electric Co., Chico, Cal.; R. P. Mills, Supr. Bridges, N. Y. C. & H. R., 138th street, Mott Haven, N. Y.

IV. Protection of Embankments from the Effects of High Water by Rip-rap or Otherwise.—G. H. Soles, Supt. B. & B., P. & L. E., Pittsburgh, Pa.; F. Ingalls, Supr. B. & B., Northern Pacific, Jamestown, N. D.; J. C. Beye, Res. Engineer, U. P., corner 12th and Liberty streets, Kansas City, Mo.; J. S. Berry, Supr. B. & B., St. L. S. W., Tyler, Tex.; W. B. Rogers, Supr. B. & B., C., St. P., M. & O., Emerson, Neb.

V. Experience in the Use of Gasolene Engines and Kerosene Engines or Combination of Same for Water Supply, Drawbridges, Etc.—A. S. Markley, Master Carpenter, C. & E. I., Danville, Ill.; E. D. B. Brown, C.E., Fairbanks, Morse & Co., Chicago, Ill.; P. Swenson, Supt. B. & B., M., St. P. & S. Ste. M., Minneapolis, Minn.; P. J. O'Neill, Master Carpenter, L. S. & M. S., Adrian, Mich.; A. W. Merrick, Asst. Engr., C. & N.-W., Boone, Iowa.

VI. Modern Dwelling Houses for Section Foremen and Section Men in Outlying Districts.—W. Beahan, Asst. Engineer, L. S. & M. S., Cleveland, Ohio; W. A. McGonagle, First Vice-President, D., M. & N., Duluth, Minn.; C. H. Bliss, Engineer New Zealand Government Rys., Auckland, N. Zealand; Thos. S. Leake, M. P., 7th and Market streets, St. Louis, Mo.; Charles Carr, Supt. Buildings, M. C., Jackson, Mich.; W. E. Harwig, Div. Engr., L. V., Phillipsburg, N. J.

VII. Re-enforced Concrete Culverts and Short-Span Bridges.—A. O. Cunningham, Chief Engineer, Wabash, St. Louis, Mo.; W. O. Eggleston, Inspector of Bridges, Erie, 99 Washington street, Huntington, Ind.; James Rogers, Supr. B. & B., N. Y., C. & St. L., Fort Wayne, Ind.; C. F. Loweth, Engr. & Supt., B. & B., C., M. & St. P., Chicago; P. Aagaard, Supr. B. & B., Ill. Cent., Chicago.

VIII. Methods of Erecting Truss Bridges—(a) Maintaining Traffic; (b) No Traffic.—M. Riney, Supr. B. & B., C. & N.-W., Baraboo, Wis.; F. B. Scheetz, Engr. B. & B., M. P., St. Louis, Mo.; G. W. Smith, American Bridge Co., No. 13 Monadnock Building, Chicago; O. J. Travis, Bow, Washington; Phelps Johnson, Manager Dominion Bridge Co.'s System, Windsor Hotel, Montreal, Can.; Jas. D. Gilbert, A., T. & S. F., Topeka, Kan

IX. Smoke Jacks for Engine Houses.—C. A. Lichty, Purchasing Dept. C., & N.-W., Chicago; J. P. Canty, Supr. B. & B., Fitchburg Div., B. & M., Fitchburg, Mass.; H. D. Cleaveland, Master Carpenter, B. & O. E., Greenville, Pa.

COMMITTEES ON STANDING SUBJECTS.

1. Pile and Frame Trestle Bridges.—H. M. Trippe, C. & N.-W., Chicago; T. J. Fullem, Supt. Buildings, Ill. Cent., 7346 Madison avenue, Chicago; A. G. Bennett, Assistant Engineer Bridges and Buildings, C., M. & St. P., Minneapolis, Minn.; J. C. Taylor, Supr. B. & B., Northern Pacific, Glendive, Mont.; D. Robertson, Southern Pacific, W. Oakland, Cal.; J. H. Howe, Union Pacific, Omaha, Neb.; H. A. Horning, Asst. Supt. Buildings, M. C., Niles, Mich.

2. Fire Protection.—J. N. Penwell, Supr. B. & B., L. E. & W., Tipton, Ind.; A. B. Hubbard, Supr. B. & B., B. & M., Boston, Mass.; D. C. Zook, Master Carpenter, Pennsylvania Lines West, Fort Wayne, Ind.

3. Fences, Road Crossings and Cattle Guards.—J. E. Barrett, Supt. T. & B. & B., Lehigh & Hudson River, Warwick, N. Y.; C. P. Austin, Supr. B. & B., B. & M., Medford, Mass.; G. F. Powers, Supt. B. & B, E. J. & E., Joliet, Ill.

4. Construction of Cofferdams.—J. H. Markley, Master B. & B., T., P. & W. Ry., Peoria, Ill.; J. P. Snow, Bridge Engineer, B. & M., Boston, Mass.; F. O. Draper, Supt. B. & B., Ill. Cent., Chicago; W. J. George, Commissioner Western Australia Government Rys., Perth, Western Australia.

5. Preservation of Timber.—F. E. Schall, Bridge Engineer, L. V., South Bethlehem, Pa.; F. D. Beal, Southern Pacific Co., West Oakland, Cal.; W. F. Steffens, Engr. B. & B., Carolina, Clinchfield & Ohio Ry., Johnson City, Tenn.

6. Coaling Stations and Cinder Pits.—C. F. King, C. & N.-W., Lander, Wyo.; E. B. Ashby, Chief Engineer, L. V., South Bethlehem, Pa.; F. G. Jonah, Terminal Engineer, N. O. Terminal Co., 241 North Rampart St., New Orleans, La.; F. P., Gutelius, Asst. Chief Engineer, C. P., Montreal, Can.; W. A. Pettis, General Inspector Buildings, N. Y. C. & H. R., 73 Glendale Park, Rochester, N. Y.; B. J. Sweatt, C. E., Boone, Iowa.

COMMITTEE ON SELECTION OF SUBJECTS.

A. Montzheimer, E. J. & E., Joliet, Ill.; W. G. Berg, L. V., New York; J. P. Snow, B. & M., Boston, Mass.; G. F. Swain, Institute of Technology, Boston, Mass.; W. H. Finley, C. & N.-W., Chicago; J. L. Neff, Union Pacific, Omaha, Neb.

COMMITTEE ON NOMINATIONS.

C. A. Lichty, C. & N.-W., Chicago; J. H. Markley, T., P., & W. Ry., Peoria, Ill.; J. B. Sheldon, N. Y., N. H. & H., Providence, R. I.; Geo. W. Andrews, B & O, Baltimore, Md

COMMITTEE ON APPLICATIONS FOR MEMBERSHIP.

C. A. Lichty, C. & N.-W., Chicago.

COMMITTEE ON RELIEF.

A. Montzheimer, E. J. & E., Joliet, Ill.

COMMITTEE ON MEMOIRS.

B. F. Pickering, B. & M., Sanbornville, N. H.

Railway Financial Officers.

The first annual meeting of the Society of Railway Financial Officers was held at the New Willard Hotel, Washington, D. C., October 14 and 15. A large proportion of the membership, which represents over 145,000 miles of railroads in the United States, Canada and Mexico, was represented at the meeting. H. C. Ansley, treasurer of the Southern Railway, gave a luncheon to the members at the New Willard.

T. H. B. McKnight, Treasurer of the Pennsylvania Lines West, was elected President; Geo. H. Crosby, Secretary and Treasurer of the Chicago, Rock Island and Pacific, was elected First Vice-President; and E. L. Rossiter, Treasurer of the New York Central & Hudson River, was elected Second Vice-President. George H. Crosby, T. H. B. McKnight, Frank Scott, Treasurer Grand Trunk, and J. F. Titus, Assistant to President, Illinois Central, were re-elected members of the executive committee, to serve until the meeting of 1910.

The following members were present at the meeting:

E. L. Copeland, Secy. and Treas., A., T. & S. F.; J. F. Post, Treas., A. C. L.; J. V. McNeal, 4th Vice-Pres. and Treas., B. & O.; C. W. Rhodes, Asst. Treas., B. & O.; Frank E. Hall, Asst. Treas., B. & S.; L. T. Beacher, Treas., B. S.; W. C. Askew, Treas., C. R. R. of G.; G. O. Waterman, Treas., C. R. R. of N. J.; C. J. Ernst, Asst. Treas., C., B. & Q.; Geo. H. Crosby, Secy. and Treas., C., R. I. & P.; J. P. Reeves, Assist. Treas., C. & E. I.; John E, Murphy, C. & W. I.; W. H. Williams, 3rd Vice-Pres., D. & H.; Chas. A. Walker, Treas., D. & H.; Gilbert S. Wright, Asst. Treas., E. & T. H.; A. C. Torbert, Treas., G., C. & S. F.; Frank Scott, Treas., G. T.; Wm. N. Catt, Treas., H. V.; Otto F. Nau, Local Treas., I. C.; R. S. Charles, Asst. Local Treas., I. C.; S. L. Shannon, Treas., I. R. of C.; H. Visscher, Treas., K. C. S.; H. F. Baker, Treas., L. & N. E.; R. P. Ahrens, Local Treas., L. S. & M. S.; J. E. Griffiths, Local Treas., M. C.; Frank Johnson, Local Treas., M., K. & T.; M. Manly, Treas., N. & S.; E. L. Rossiter, Treas., N. Y. C. & H. R.; Odell S. Smith, Secy. and Treas., Norfolk & Washington Steamboat Co.; T. H. B. McKnight, Treas., Penna. Co.; Richd. W. Morrison, Asst. to Treas., P. C.; G T. Boggs, Secy. and Treas., R. I. Co.; F. H. Hamilton, Treas., St. L. & S. F.; Leonard O. Williams, Secy. and Treas., St. L., S F. & T.; Robt. L. Nutt, Treas., S. A. L.; H. C. Ansley, Treas., S. R.; E. F. Parham, Asst. Treas., S. R.; Wm. H. Leete, Treas., S. P., L. A. & S. L.; Frank D. Brown, Local Treas., U. P.; R. B. Thompson, Asst. Treas., V.; J. G. Stidger, Asst. Treas., W. & L. E.

Disastrous Wreck Due to a Forest Fire.

On the night of Thursday, October 15, a train carrying refugees from Metz, Mich., on the Detroit & Mackinac, was derailed at a point two miles south of that village, where the track had been warped by the heat of piles of burning ties, ignited by forest fires, and 14 or more persons were burned

to death, the train catching fire instantly. The people of Metz became alarmed for the safety of their village late Thursday afternoon, and the engine and five cars of a local freight train, a few miles away, were rushed to the town, with a view to taking the people to a place of safety. There was considerable delay in loading household goods, and the train did not get away until late at night. Finally it was started north, but ran only a few miles before the way was found to be impassable, and then it was moved southward. It had gone but a few miles, however, when the whole train was derailed, as above stated. The derailed train was quickly enveloped in flames. Many of the occupants jumped off, and a number of them succeeded in reaching Posen, the next town, on foot, though not without severe burns. The larger number of those killed are said to have been women and children, who were in a high-side, steel gondola car. The enginemen and conductor reached Posen badly burned, the conductor's eyesight being destroyed.

No Extra Dividend on United States Express Stock.

In the report of the United States Express Co. for the year ended June 30, 1908, gross earnings were shown as $16,983,638, with net earnings from transportation, $37,734, and earnings from other sources, $469,930, making total net income, $507,664. The following statement is made by the company's management:

"As will be observed, the net earnings have been insufficient to justify an aditional one per cent. dividend, such as was paid a year ago. The express business has suffered severely from various causes. The requirements of commissions created by the national and state governments have cost the company during the last year $250,000, equal to two and one-half per cent. of the capital of the company. Another important item is the continually increasing charges for railroad transportation. These, taken together with the general decrease of business and the increased cost of labor and supply have absorbed nearly all of the profits of the company's business."

In a circular sent out by the minority stockholders' committee some time ago, stockholders were asked to express an opinion as to the advisability of selling one-half of their holdings at 105 to a syndicate composed of men satisfactory to them all, or of dissolving the company. It is said that a majority of the replies so far received favored a dissolution of the company.

Annual Meeting of Railway Surgeons.

The fifth annual meeting of the American Association of Railway Surgeons was held at the Palmer House, Chicago, October 14 to 16. The program consisted of a number of 20-minute addresses by surgeons of different roads on medical treatment and surgery. The meetings this year were attended by larger numbers than on any previous occasion. The officials for the ensuing year were elected as follows: President, Dr. J. R. Hollowbush, Rock Island, Ill.; Vice-Presidents, Dr. Ben Thompson, Tama, Iowa; Dr. Oscar Le Seure, Detroit, Mich.; Dr. G. W. Thompson, Winamac, Ind. Secretary-Treasurer, Dr. H. B. Jennings, Council Bluffs, Iowa; Editor, Dr. Louis J. Mitchell, Chicago; Members Executive Board, Dr. E. M. Eckard, Peoria, Ill.; Dr. Rhett Goode, Mobile, Ala.

The Railway Business Association.

The Railway Business Association, 2 Rector street, New York City, has issued a pamphlet, giving full particulars about the work in hand, and a reprint of the addresses at the organization meeting. The following spicy paragraphs adorn the present publication:

The national grouch against railroads can be cured.

The anti-railroad agitator can be put to sleep.

Strong doses of fact are the opiate required.

The Railway Business Association will furnish the facts.

Investors can be reassured.

Railroad extension and the purchase of material and equipment can be started up.

Hundreds of millions of investment dollars are idle. Thousands upon thousands of your workmen are idle. Why? Because the anti-railroad agitator is busy. The Railway Business Association has undertaken to put that money and those workmen back in their jobs. How? By putting the agitator out of his. Will you help, and get your employees to help? It means business for you and work for them.

Two million men work for railroads or for concerns which sell to railroads.

The politicians don't know that. At least they act as if they didn't.

The Railway Business Association is going to tell them and get the members' employees to tell them.

Enlist. There is business in it.

How many men have you laid off? Do they want to resume work? It is up to them. They can cork the anti-railroad agitator and bring back prosperity if they try. The Railway Business Association will show them how.

No "Full-Crew Law" in Massachusetts.

Effort made in the Massachusetts Legislature to secure a law requiring five men on every freight train resulted in the question being referred some time ago to the State Railroad Commission, which has now decided against any specific requirement of additional men on crews. The Board's finding was as follows, after a public hearing and informal conferences with officers and employees:

"The 'safety and convenience of the public and the safety of employees' is made by legislative action the basis upon which any recommendation must be founded. These factors must be considered together and due regard had to each. We have therefore made an examination of the present methods of operating and manning freight trains, and a careful study of the movement of freight under the operating rules of the several companies.

"No complaint has been made to us with respect to the convenience of the public. * * * Two suggestions have been submitted—that the number of brakemen on freight trains should be based upon the number of cars in the train, and that freight trains should be classified and the number of brakemen based upon the classification.

"Neither of these suggestions adequately provides for the varying conditions under which freight trains are operated. The classes and volume of freight to be moved, the rating of locomotives, tonnage of trains, grades and curves, trackage and signal protection are some of the reasons which make these suggestions impracticable.

"To arbitrarily base the number of trainmen upon either or both of these suggestions would not tend to secure additional safety and convenience in operation, but would tend to a rearrangement and consequent disturbance of traffic. A feasible means of securing the safety of the public and employees is to be found, in our opinion, in a strict and rigid enforcement of the existing operating rules of the companies. These rules, in addition to the provisions of law, would secure the safety of the public and of the employees contemplated in the order of the General Court.

"The laws of the Commonwealth provide for various safety devices in connection with the operation of trains, and specifically provide for one brakeman for the last car of every freight train. The operating rules of the several railroads are the standard code of rules of the American Railway Association, with certain changes to meet local conditions. These rules, which contain definite requirements relative to the movement of freight trains, the duties of freight brakemen and block signal rules, are the result of the experience and deliberation of practical railroad men.

"At the hearing no specific instances were called to our attention of unsafe conditions in the movement of freight trains, and none have been disclosed by our investigation that cannot be reasonably safeguarded by the strict and rigid enforcement of the present rules in connection with existing laws. A full compliance with these rules means, however, not only strict enforcement by officials, but a complete provision by the corporations for an adequate number of employees to carry the rules into full effect. * * *"

Traffic News.

Lake navigation will close officially on Nov. 1.

The St. Louis & San Francisco has filed a 3-cent passenger rate tariff with the Arkansas state railroad commission.

Steps are being taken toward the organization of a traffic club at Indianapolis similar to the traffic clubs of New York, Pittsburgh, Philadelphia, Chicago and St. Louis.

In the United States District Court sitting at Lockport, N. Y., on October 13, the case of the government against the Standard Oil Co. was continued until November 6.

The Railroad Commission of Louisiana has adopted a rule that railroads in the state shall allow 48 hours' free storage after destination is reached on baggage and commercial samples.

The State Railroad Commission of Colorado has issued a circular relaxing the strict requirements of the law in that state in regard to the posting of passenger and freight tariffs at stations. Any road not carrying out the instructions of the commission carefully and in good faith will be required to comply with the full letter of the law.

The Western Classification Committee has decided to reduce from 40,000 to 30,000 lbs. the minimum carload weight of fire brick, fire clay, drain tile, sewer pipe, flue lining and vitrified coping. The change will be effective on November 1. The action was taken because it was claimed by shippers that usually cars could not be loaded to the minimum.

The Railroad Commission of Louisiana has denied a petition of certain shippers that it require the railroads of Louisiana to apply the same car service rates and rules as obtain in Texas. The commission said that after careful study of the proposed rules it had decided they would not be as beneficial to shippers as the rules and regulations already in effect in Louisiana.

The United States Circuit Court of Appeals, at Atlanta, Ga., October 13, continued the injunction against reduced freight rates on certain southern railroads, ordered some time ago by Judge Speer, but required the railroad companies to give bonds of $100,000 each to repay shippers in case the high rates should finally be declared unlawful. The next hearing will be held at New Orleans, November 11.

The Pullman Company has filed with the Interstate Commerce Commission a new tariff which covers the entire country and is intended as a substitute for the four rate sheets of the Northwestern, Northeastern, Southwestern and Southeastern districts heretofore used. The new book is a readjustment only; there are a few general reductions besides the small seat rate cut, but none of great importance.

M. J. Dempsey, Traffic Manager of the United Fruit Company, left New Orleans October 17 to visit Port Barrios where he hopes to adjust freight rates and differences with the Gautemala Railroad, and thereby open up and stimulate business via New Orleans. Mr. Robert S. Johnson, naval architect for Belfast shipbuilders, who built several ships for the United Fruit Co., accompanied Mr. Dempsey, with a view to improving present plans of the Fruit Company, for fruit-carrying.

The Baton Rouge Board of Trade complained to the Railroad Commission of Louisiana that the rates on freight over the Louisiana Railway & Navigation Company's line from Baton Rouge were discriminative as compared with the rates from New Orleans to the same points, and the Commission has ordered the company to desist from charging more than 80 per cent. of the rates from New Orleans on shipments from Baton Rouge to points north of Baton Rouge and south of Alexandria, excepting at competing points, where short line rates must be protected.

The roads belonging to the Trans-Missouri Freight Bureau have established a rate of 35 cents per 100 lbs. from Denver, Ft. Lupton and other Colorado points on condensed milk to several jobbing points in Kansas, including Salina, Wichita, Hutchinson and Topeka. The former rate was 50 cents. The Burlington has made a reduction on beer rates from Denver to points in Wyoming and Montana, averaging 9 cents per 100 lbs. The Santa Fe has made reductions in rates on canned goods from Denver to all stations on its line from Grants, N. Mex., to Ash Fork, Ariz., averaging 30 cents per 100 lbs.

B. F. Jones of Independence, Oregon, has filed with the Railroad Commission of Oregon a general complaint that the rates charged by Wells, Fargo & Company are excessive and unreasonable. Wells, Fargo & Company filed a reply, stating that they have 7,381 general merchandise rates in Oregon, 7,381 general-special rates and enough extra special rates to bring the total number of rates up to 20,000. They argued that a complaint should point out the particular rates which were deemed unreasonable, so that the company may prepare its defense. The Commission refused to dismiss the complaint and it will set a date for hearing.

A reduction in the rates from St. Louis to the gulf ports on traffic for export to all countries except those of Europe, Asia and Africa will become effective on October 31. The new class rates will be 65 cents, 56½ cents, 48 cents, 43½ cents, 34½ cents, 30½ cents, 26 cents and 21½ cents, being reductions of 10 cents, 8½ cents, 7 cents, 6½ cents, 5½ cents, 4½ cents, 4 cents and 3½ cents on classes 1 to 6 and under rules 25 and 26. It is expected that this will enable St. Louis shippers to extend their trade to Cuba, Porto Rico and Central and South America. The rates apply to New Orleans, Mobile, Port Chalmette, Westwego, Galveston and Texas City.

The transcontinental roads have filed with the Interstate Commerce Commission new rates on lumber from Montana and eastern Oregon points to Minnesota Transfer and Dakota and Colorado points. The rates, with one exception, are lower than those that were put into effect by the railroads on November 1, 1907, and were held unreasonable by the Interstate Commerce Commission. The exception is an increase in the rate on cedar timber which was allowed by a special decision of the Commission, permitting a differential of 10 cents on lighter lumber as compared with the heavier woods. The counsel for the northwestern lumbermen has filed with the Commission a protest against this one advance.

J. Farley, Commissioner of the Dallas Freight Bureau, on October 14 asked the Railroad Commission of Texas to increase the rate on less than carload shipments of tropical fruits from Galveston to various points in Texas to a maximum of 80 cents for a haul of 640 miles and to abolish all differentials in rates on such fruits. The present maximum L.C.L. rate from Galveston of 52 cents is reached at 295 miles. Mr. Farley asked for a rate of 55 cents on hauls up to 250 miles. His object in asking for the advance in rates from Galveston is to give the shippers at San Antonio, Dallas, Fort Worth and other points a better chance to compete with the shippers of Galveston in handling and selling fruits. He showed that the carload rate from Galveston to Dallas and similarly located points is 49 cents, and, as the L.C.L. rate from Galveston is only 52 cents, the jobbers there can compete successfully against those at Dallas and other cities in their own immediate territory.

At New York Oct. 20 the United States Circuit Court heard arguments on the motion in behalf of the New York Central, the Erie, the Pennsylvania, the Lehigh Valley, the Lackawanna and the New York, New Haven & Hartford Railroad companies, to issue an injunction suspending the order of the Interstate Commerce Commission fixing reduced rates to be charged on grain products from Buffalo to New York and Buffalo to Boston. The order therefore becomes effective on November 1. The roads asked to have it suspended until the suits in equity instituted by the companies against the commission shall have been tried. The railroads contended that the present rate from Buffalo to New York of 11 cents a hundred pounds, and the Buffalo to Boston rate of 13 cents a hundred pounds, which went into effect on May 1, 1907, were just and reasonable, and the Commission's order for a reduction to 10 and 12 cents unreasonable, the rates were raised from 9 and 11 cents because of an increase of rates in the Central Freight Association's territory. It was claimed that by the repeal of Section 14 of the Inter-

state Commerce Act the commission had no power to make findings of fact.

The Railroad Commission of Louisiana has made an order, effective October 25, that concentration charges on cotton seed at points where actual water or rail competition does not exist must be abolished. The present net rates on all inbound and outbound shipments of cotton seed and cotton seed products are to be applied. The Commission states that it has allowed the railroads to make an arbitrary charge of 3 cents per 100 lbs. in addition to local rates on cotton seed shipped to cotton seed oil mills to be made into oil, meal, cake and hulls. These charges were allowed to protect the carriers' revenues on the outbound products and were to be refunded when 50 per cent. of the tonnage on the seed, in products, was delivered for re-shipment to the carrier hauling the seed to the mill. Such charges are only needed at competitive points, as at other points the product can only be shipped out by the road by which it was shipped in. The Commission decided to abolish the charge at non-competitive points because it found that some of the roads had been unjustly withholding concentration charges.

After a conference lasting several days the Railroad Commission and the Attorney-General of Arkansas and traffic officers of the railroads doing business in that state decided on October 15 that they could not agree on freight and passenger rates to take the place of the 2-cent fare and the reduced freight rates, the enforcement of which was restrained by the federal court at St. Paul, September 2 (*Railroad Age Gazette*, September 11, p. 926); and the conference broke up. The railroads have decided to advance both freight and passenger rates without any agreement or understanding with the Commission. The St. Louis & San Francisco filed a 3-cents-a-mile intrastate passenger tariff with the Railroad Commission on October 16 and other roads will follow its example. It is understood that the new intrastate freight tariffs will be substantially the same as those in effect before the Commission made the reductions, the enforcement of which the federal courts have restrained. J. M. Johnson, Vice-President of the Missouri Pacific and Iron Mountain system, is quoted in an interview as saying that the only course open to the roads was to reduce wages or increase transportation rates. The Commission made objections to a number of rates in the tariffs the railroads proposed, and the roads will give consideration to their views. The tariffs which the roads submitted to the Commission have been withdrawn, but it is expected that other tariffs will be filed in time to go into effect on November 1.

Suit was brought in the United States Circuit Court at Chicago on October 17 to restrain the Interstate Commerce Commission from enforcing its order in the Missouri River Jobbers' case (Burnham, Hanna, Munger et al. v. C. R. I. & P. et al.). The Commission's order in this case was discussed in the *Railroad Age Gazette*, September 18, page 938. The petitioners include not only the roads that were parties to the case before the Interstate Commerce Commission, but also other roads having lines running from the Mississippi to the Missouri river. The bill for injunction alleges that if the reduction were made, as ordered, in rates between the Mississippi and Missouri rivers it would reduce the revenues of the carriers $1,000,000 a year. It also alleges that the application of the principle established by the order, namely, that through rates shall be less than the sums of the local rates, will necessarily result in the lowering of through rates which will entail upon the carriers the loss of millions of dollars more. It is declared that the reduction ordered is excessive and unreasonable, is based on no finding of the Commission that existing rates are too high, and would work an unfair discrimination against jobbers at Chicago and St. Louis. It is claimed that the application of the through-rate principle will change the entire rate structure of the country and will substitute for a system based on commercial and geographical conditions one based simply on law and theory. The railroads asked the Commission for a re-hearing in this proceeding but it was denied.

There is still some agitation for a so-called "Clean Bill of Lading." The National Industrial Traffic League at St. Louis recently passed a resolution favoring the use of a bill of lading with no conditions whatever, except that the property "be transported and delivered in accordance with the provisions of law in good order to consignee." Later, however, upon further consideration, this organization decided to accept the new uniform bill of lading under protest. But the proposition to adopt a uniform bill of lading, setting forth the conditions of shipment explicitly has received the generous support of shippers. C. S. Belsterling, Traffic Manager of the American Bridge Company, has written the Interstate Commerce Commission as follows: "A clean bill of lading would not bring uniformity, but would subject the contract of transportation to the glorious uncertainties of the law. I do not believe it would be good policy to deprive the transportation company from contracting on a reasonable basis, nor do I believe it would be good policy for a shipper to be deprived of such a privilege. When we ship our goods from the twenty some plants which are scattered throughout this country, we desire to know under what terms the material is forwarded, instead of having the contracts subjected to the uncertain and various state interpretations of the law. For instance, in Pennsylvania, a railroad company has no right of lien for demurrage unless it is clearly stipulated in the contract. The bill of lading is the contract and is, perhaps, the only means that would enable the transportation company to exercise a right over its cars, instead of allowing them to be abused by the shipping public. In Ohio and other states a railroad company has a lien on demurrage. We are perfectly willing to abide by the bill of lading as submitted by Mr. Levi Mayer, of Chicago, which was in the nature of a compromise. Such a proposition is more advisable than to tear down the contract of transportation under which the shipping public has been forwarding goods for years. I am not in sympathy with any clean bill of lading that assumes the aspect of a destructive policy rather than a constructive policy."

STATE COMMISSIONS.

Vermont. Regulation by State Commission of International Traffic.

Re notice to Canadian Pacific to show cause why its Train No. 13 should not be delayed at Richford, Vt., until 8:15 p. m., for the purpose of connecting with Central Vermont Train No. 55.

This is a notice issued by the board, of its own motion, notifying the Canadian Pacific to show cause why an order should not be made requiring it to hold its southbound passenger train No. 13 at Richford, Vt., for 20 minutes beyond its schedule leaving time when the passenger train of the Central Vermont No. 55 is late in arriving at Richford. The Canadian Pacific train No. 13 leaves Montreal, Quebec, at 4.30 p.m. and arrives at Richford, Vt., at 7.55 p.m. and at Newport, Vt., at 9 p.m. The train stops at every station between Montreal and Newport and goes no farther; it also has no connection to make with other trains at Newport. The train is admitted to be an international one. The distance from Richford to Newport is 31 miles, 10 of which is in Canada and the remainder in Vermont. There is a Canadian Pacific passenger express train which arrives at Richford at 10.10 p.m. and at Newport at 11.15 p.m., but does not stop between these two stations. There is a Central Vermont train No. 55 which leaves St. Albans at 6.30 p.m. and is due at Richford at 7.46 p.m. This is a local train stopping at eight stations in the 28 miles between St. Albans and Richford. It is admitted that the average number of passengers on the Central Vermont train No. 55 desiring to take the Canadian Pacific local No. 13 from Richford is about four or five. It is also admitted that these passengers if they miss the Canadian Pacific local and desire to go to stations between Richford and Newport either have to drive or wait over a day. If they desire to go beyond Newport they can catch the 10.10 through express on the Canadian Pacific at Richford. The commission held that the service to passengers arriving at Richford on the Central Vermont train No. 55 and desiring to go to local stations between Richford and Newport is inadequate, and that the Canadian Pacific should be ordered to hold its local train No. 13 for 20 minutes at Richford when the Central Vermont train is late and notifies the station agent at Richford that it carries passengers who desire to catch the Canadian Pacific train. The fact that this is a regulation of international traffic is not denied.

REPORT OF REVENUES AND EXPENSES OF RAILROADS

MONTH OF AUGUST, 1908.

See also issue of October 16.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations,	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with 1907.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Baltimore & Ohio	3,992	$4,739,643	$1,318,963	$6,372,251	$767,180	$834,620	$130,197	$2,023,957	$116,705	$3,872,659	$2,499,592	$20,467†	$167,624	$2,311,501	‡$162,381
Bangor & Aroostook	515	123,548	59,880	195,352	39,112	28,701	2,672	62,755	8,765	142,005	53,347	.....	1,500	51,847	‡3,274
Chicago & Eastern Illinois	966	640,262	165,175	854,162	107,357	145,374	15,219	286,518	31,853	586,321	267,841	1,013†	27,500	239,328	‡10,539
Chicago & Northwestern	7,632	3,649,118	1,687,022	5,770,643	825,899	642,248	86,013	1,926,370	84,850	3,565,380	2,205,263	20,523	230,000	1,995,786	‡48,652
Chicago Great Western	818	452,738	226,750	731,680	96,423	113,438	36,570	276,689	29,373	552,493	179,187	.....	20,076	159,111	‡18,902
Chicago, Indianapolis & Louisville	616	303,611	139,968	487,142	86,694	64,185	12,238	140,337	13,225	316,679	170,463	.....	21,500	148,963	‡55,338
Chicago, Lake Shore & Eastern	580	301,884	.....	327,272	28,889	81,450	1,087	102,795	5,152	219,373	107,899	.....	3,000	104,899	‡71,208
Chicago, St. Paul, Minn. & Omaha	1,730	653,350	369,714	1,098,580	194,287	126,803	21,230	382,863	23,189	748,372	350,208	2,321	52,970	299,559	17,569
Colorado & Southern	1,250	462,200	184,493	686,223	106,566	113,472	15,413	209,807	22,143	467,401	218,822	3,245†	21,041	194,536	50,544
Denver & Rio Grande	2,493	1,162,380	516,979	1,764,400	237,007	245,428	41,014	542,363	47,287	1,113,099	651,301	12,614	64,000	599,915	‡154,924
Duluth, South Shore & Atlantic	593	112,861	95,139	222,549	41,559	25,504	9,355	79,949	5,550	161,917	60,632	2,897	15,000	48,529	‡43,744
Florida East Coast	584	63,727	48,681	135,318	51,467	42,153	4,504	78,450	7,440	184,014	48,695*	.....	11,000	59,695†	‡3,243
Grand Rapids & Indiana	582	210,587	213,979	453,038	40,346	54,031	9,822	147,604	12,780	264,583	188,455	889	20,761	168,583	18,399
Gulf, Colorado & Santa Fe	1,518	724,741	265,782	1,039,216	162,755	187,255	19,661	368,511	33,835	772,017	267,199	.....	32,429	234,770	119,161
Houston & Texas Central	789	296,435	133,293	459,840	77,910	60,466	14,805	174,931	18,822	346,934	112,906	.....	9,010	103,896	‡44,623
Iowa Central	558	196,929	56,518	265,675	25,265	37,601	8,152	100,544	8,309	179,871	85,804	14†	7,364	78,426	1,282
Maine Central	931	367,017	381,869	797,240	126,393	85,719	7,542	248,706	19,897	488,257	308,983	6,454	31,622	283,815	‡35,160
Minneapolis & St. Louis	1,028	193,111	125,407	340,783	38,772	40,358	9,737	109,610	10,495	208,972	131,811	10†	14,610	117,191	9,415
Missouri Pacific	3,492	1,389,671	379,050	1,945,118	236,236	243,996	42,407	734,244	52,805	1,309,688	635,430	83	77,105	558,408	‡19,289
Norfolk & Southern	582	98,403	64,693	178,107	30,619	22,416	4,680	58,120	12,617	128,452	49,655	1,174†	6,800	41,681	‡10,528
Oregon R.R. & Nav. Co.	1,264	783,292	324,484	1,172,310	138,750	71,445	20,470	310,170	27,239	568,074	604,236	4,710	42,178	566,768	70,041
Oregon Short Line	1,456	983,022	365,308	1,430,059	205,237	140,710	17,307	277,869	26,701	667,824	762,235	1,300	48,083	715,452	‡33,803
Pennsylvania R.R. Co.	4,163	7,800,663	2,772,321	11,271,881	1,141,345	1,708,345	147,705	4,023,860	265,982	7,287,206	3,984,675	127,356	174,339	3,937,692	‡1,088,571
Philadelphia & Reading	1,007	2,220,112	568,176	2,905,754	288,344	585,786	38,010	904,404	50,312	1,866,856	1,038,898	61,789	61,006	1,039,681	‡597,016
Phila., Balt. & Washington	714	647,024	611,030	1,385,731	184,148	189,735	18,770	565,016	25,996	983,665	402,066	764†	31,142	370,160	‡46,883
St. Louis & San Francisco	4,727	1,915,556	848,328	2,993,918	464,420	403,314	64,776	1,019,657	84,827	2,036,994	956,924	4,564	91,547	869,941	‡113,930
St. Louis, Iron Mtn. & Southern	2,609	1,266,625	382,146	1,800,528	254,562	223,085	40,729	624,160	56,688	1,199,224	601,304	120	63,161	538,263	‡145,512
St. Louis Southwestern	773	408,087	97,964	526,501	69,965	94,506	18,414	134,612	17,817	335,314	191,187	151†	15,025	176,011	‡92,250
St. Louis Southwestern of Texas	697	175,025	87,814	280,598	71,951	73,085	7,783	126,165	14,338	293,322	12,724*	206†	9,166	22,096†	‡38,879
San Antonio & Aransas Pass	727	257,790	87,386	362,268	44,827	32,608	3,918	119,677	8,644	209,674	152,594	.....	8,500	144,094	29,809
San Pedro, Los Angeles & Salt Lake	1,099	311,354	202,902	549,215	90,922	66,754	22,197	174,933	15,306	370,112	179,103	1,550†	21,184	156,369	13,809
Southern Pacific—Pacific System	5,577	4,004,850	2,356,358	6,813,736	891,837	753,001	114,824	1,800,391	183,119	3,743,172	3,070,564	38,106†	214,610	2,817,848	220,894
Southern Pacific—Atlantic S. S. Lines	.....	422,697	49,812	476,660	.....	.....	.....	.....	.....	422,282	54,378	2,867	.....	57,245	‡111,843
Texas & Pacific	1,885	677,503	330,407	1,071,902	141,572	173,117	17,033	441,797	32,673	806,192	265,710	4,111†	80,000	181,599	‡103,745

MONTHS OF JULY AND AUGUST, 1908.

Baltimore & Ohio	3,992	$9,006,955	$2,461,517	$12,094,356	$1,549,880	$1,571,736	$274,318	$3,938,976	$235,798	$7,570,708	$4,523,648	$74,789†	$332,845	$4,116,013	‡$442,749
Bangor & Aroostook	515	238,459	111,482	376,686	74,310	50,088	5,659	124,506	18,481	273,044	103,642	.....	3,000	100,642	‡19,065
Chicago & Eastern Illinois	966	1,226,298	308,841	1,628,927	205,438	261,329	29,757	560,308	69,743	1,126,575	502,352	1,857†	55,000	445,495	‡49,974
Chicago & Northwestern	7,632	6,881,870	3,224,430	10,985,829	1,609,249	1,182,408	188,954	3,748,697	186,836	6,916,144	4,069,685	18,615	460,000	3,628,300	‡213,284
Chicago Great Western	818	841,932	400,770	1,345,443	177,769	196,769	71,632	543,005	63,297	1,052,472	292,971	.....	37,076	255,895	‡60,701
Chicago, Indianapolis & Louisville	616	592,287	261,025	940,744	173,729	131,919	23,924	272,253	27,157	628,982	311,762	.....	43,000	268,762	‡96,125
Chicago, Lake Shore & Eastern	580	633,135	.....	685,772	64,439	156,440	2,136	207,313	10,473	440,801	244,971	.....	6,000	238,971	‡107,778
Chicago, St. Paul, Minn. & Omaha	1,730	1,239,460	712,877	2,097,068	350,780	227,208	43,534	740,068	53,333	1,414,923	682,145	5,642	105,939	581,848	‡2,468
Colorado & Southern	1,250	949,627	370,615	1,394,835	206,064	222,222	29,416	407,136	45,635	910,473	484,362	2,699†	40,797	440,866	101,153
Denver & Rio Grande	2,493	2,265,350	1,021,099	3,449,238	451,922	441,622	79,577	1,066,666	95,975	2,135,762	1,313,461	21,352	125,000	1,209,813	‡306,130
Duluth, South Shore & Atlantic	593	233,374	186,991	448,663	85,364	48,127	18,793	156,699	17,298	326,281	122,383	5,821	30,000	98,204	‡80,082
Florida East Coast	584	143,190	100,971	295,435	96,067	87,608	7,940	164,367	15,971	371,953	76,518*	.....	22,000	98,518†	‡1,745
Grand Rapids & Indiana	582	392,440	371,278	820,735	86,276	105,711	20,146	287,842	26,426	526,401	294,334	513	41,521	253,326	‡6,906
Gulf, Colorado & Santa Fe	1,518	1,326,391	501,765	1,927,528	320,893	329,714	37,913	687,009	65,676	1,441,205	486,323	.....	64,859	421,464	279,004
Houston & Texas Central	789	599,826	256,928	919,669	131,141	122,687	28,605	375,572	38,357	696,362	223,307	.....	31,150	192,157	‡49,824
Iowa Central	558	368,262	104,643	497,388	53,207	72,203	17,475	195,969	16,702	355,356	141,832	418†	14,823	126,591	‡12,263
Maine Central	931	728,999	693,917	1,519,549	257,882	170,291	16,077	497,596	40,979	982,825	536,724	9,654	63,244	483,134	‡132,103
Minneapolis & St. Louis	1,028	380,634	229,737	653,797	74,058	77,571	18,891	224,706	21,595	416,821	236,976	2	28,499	208,479	‡28,733
Missouri Pacific	3,492	2,678,448	734,127	3,750,443	467,939	439,530	80,287	1,416,442	125,149	2,529,347	1,221,096	270	154,210	1,067,156	55,029
Norfolk & Southern	582	198,892	131,894	362,020	73,861	47,666	10,140	125,996	28,625	286,288	75,732	6,023	13,600	68,155	‡17,870
Oregon R.R. & Nav. Co.	1,264	1,526,622	663,485	2,316,048	296,138	138,823	42,214	586,195	55,173	1,118,543	1,197,505	7,996	84,347	1,121,154	70,278
Oregon Short Line	1,456	1,999,919	771,459	2,982,457	421,646	245,488	38,648	526,166	53,851	1,285,799	1,696,658	1,387	96,166	1,601,879	‡8,408
Pennsylvania R.R. Co.	4,163	15,444,822	5,309,734	22,204,848	2,428,291	3,478,541	310,652	7,995,300	523,930	14,736,714	7,468,134	244,716	348,678	7,364,172	‡1,904,786
Philadelphia & Reading	1,007	4,390,622	1,080,322	5,729,070	554,575	1,156,226	78,018	1,773,771	108,991	3,671,581	2,057,489	98,517	122,254	2,033,753	‡1,089,588
Phila., Balt. & Washington	714	1,387,948	1,151,480	2,811,455	372,729	410,482	39,850	1,140,365	51,292	2,014,718	796,737	1,092†	62,283	733,362	‡19,838
St. Louis & San Francisco	4,727	3,645,022	1,599,012	5,688,479	895,715	758,611	119,959	1,979,424	180,251	3,933,960	1,754,519	.....	183,095	1,571,424	‡264,949
St. Louis, Iron Mtn. & Southern	2,609	2,450,023	741,880	3,496,944	506,613	415,022	77,414	1,229,262	112,294	2,340,605	1,156,339	118	126,322	1,030,135	‡148,014
St. Louis Southwestern	773	787,462	191,782	1,022,316	122,968	183,061	35,641	269,210	36,061	646,941	375,375	430†	30,050	344,895	‡125,959
St. Louis Southwestern of Texas	697	360,489	163,001	561,890	154,312	136,695	16,689	256,829	28,642	593,167	31,277*	445†	18,333	50,055†	‡110,278
San Antonio & Aransas Pass	727	435,691	166,583	637,393	97,754	66,957	7,522	225,518	16,902	414,653	222,740	.....	19,200	203,540	14,244
San Pedro, Los Angeles & Salt Lake	1,099	592,124	412,534	1,072,467	192,131	130,656	44,013	369,166	31,725	767,691	304,776	2,297†	42,019	260,460	‡7,658
Southern Pacific—Pacific System	5,577	7,971,363	4,779,488	13,642,666	1,704,506	1,430,027	216,121	3,523,856	381,879	7,256,389	6,386,277	775	429,217	5,957,836	237,800
Southern Pacific—Atlantic S. S. Lines	.....	814,195	105,374	928,199	.....	.....	.....	.....	.....	841,274	86,925	7,602	.....	94,527	‡109,421
Texas & Pacific	1,885	1,281,943	628,521	2,037,927	292,740	331,894	30,814	860,236	66,160	1,581,845	456,082	5,577†	162,903	287,602	‡264,794

*Deficit. † Loss. ‡Decrease.

Resolutions of Trans-Mississippi Commercial Congress.

The Trans-Mississippi Commercial Congress at San Francisco adopted resolutions favoring, among other things, the following action by Congress:

The improvement of the steamship and mail facilities between the principal ports of the United States and Latin America, and the establishment of a government line of steamships between San Francisco and Central American ports if the Pacific Mail & Steamship Company does not improve its service.

The amendment of the interstate commerce act to provide that the Interstate Commerce Commission may make rules and regulations compelling the railroads to despatch and deliver live stock and perishable freight with reasonable promptness, and providing penalties for disobedience.

The passage of an amendment to the interstate commerce law giving the Interstate Commerce Commission power to suspend advances of freight rates until their reasonableness can be inquired into and to make it obligatory for transportation companies to submit advances of rates to the Commission before putting them into effect.

Freight Car Balance and Performance, May, 1908.

Arthur Hale, Chairman of the Committee on Car Efficiency of the American Railway Association, in presenting statistical bulletin No. 32, covering car balance and performance for May, 1908, says:

"The number of surplus cars averaged during May 393,219, or 18.32 per cent. of all cars on reporting roads. The bad order cars averaged 8.98 per cent., making a total of 27.32 per cent. of the equipment which contributed nothing to the car mileage, ton mileage or earnings included in our totals. We have heretofore used 5.02 per cent. as the normal shop percentage, and deducting this figure from the 27.32 per cent. we have 22.30 per cent. as the proper reduction to make in the number of cars in order to arrive at an approximate figure representing the performance of the cars actually in use during the month.

"The averages, adjusted on this basis, will be as follows:

Average miles per car per day	24.8
" ton-miles per car per day	329
" daily earnings per car on line	$2.22

"While the daily mileage as adjusted compares favorably with the average during normal periods, the ton-miles per car and the daily earnings show the effect of the empty car movement and the decrease in the average car load. There was some improvement in the loaded mileage during the month, the percentage increasing to 67.5 per cent. as compared with 66.5 per cent. during the preceding three months. This figure is still rather low, however, especially during a time of car surplus when it would seem that business should be handled with a minimum of empty mileage. There was practically no change in the car balance figures, and the per cent. of cars on their home lines remains at 78 per cent., the point reached on the April report.

"In May, 1907, the per cent. of cars on their home lines was 55 per cent., and the distribution of equipment was so unequal that the total cars held on the lines in the various groups ranged from 85 per cent. in groups 3 (Eastern), and 8 (Middle Western), to 151 per cent. and 156 per cent. in groups 1 (New England) and 9 (Southwestern), there being but three groups (including the Mexican group, which has since been discontinued), holding cars within 5 per cent. of the total number owned by the lines comprising the group. In May, 1908, the range was from 93 per cent. in group 4 (South Atlantic) to 113 per cent. in group 9 (Southwestern), while there were seven out of the 11 groups which held equipment within 5 per cent. of their total ownership.

"From a study of the balance figures for the larger roads, it would appear that the number of foreign cars in use has reached about the lowest point probable without an entire suspension of through car loading and interchange, and there should be little or no further increase in the per cent. of cars on their home lines in the reports for subsequent months. The per cent. of cars in shops is naturally much higher than during May, 1907, when the conditions were such as to require closer attention to car repairs. The average cars per

Car Balance and Performance in May, 1908.

	New England.	New York, New Jersey, Del., Md., Eastern Pa.	Ohio, Indiana, Mich., Western Pa.	Virginia, W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minnesota.	Montana, Wyo., Neb., Dakotas.	Kansas, Colo., Okla., Ind. T., Mo., Ark.	Texas, Louisiana, N. Mex.	Oregon, Idaho, Nev., Cal., Arizona.	Canadian Lines.	Grand total.
Revenue freight cars owned	70,544	671,897	280,226	135,236	171,438	369,519	15,831	139,627	25,905	113,859	96,530	2,090,612
Average number system cars on line	55,121	503,322	238,141	102,904	133,892	303,907	6,874	111,154	17,157	41,367	79,981	1,623,820
Railroad-owned cars: Av. foreign on line	20,988	137,288	57,529	22,651	28,649	59,130	9,565	21,592	12,050	38,222	13,646	421,310
Total cars on line	76,109	640,610	295,670	125,555	162,541	363,037	16,439	132,746	29,207	109,589	93,627	2,045,130
Excess	5,565	15,444	15,444	.....	.....	.....	608	.....	3,302	.....	.....	.....
Per cent. cars on line to total owned:												
Home	78	.....	85	76	78	82	43	80	66	62	83	78
Foreign	30	75	21	17	17	16	61	15	47	34	14	20
All railroads	108	95	106	93	95	98	104	95	113	96	97	98
Private cars on line	2,182	37,683	13,508	3,061	6,494	11,701	1,065	7,276	2,504	9,287	3,913	98,674
Total, all cars on line	78,291	678,293	309,178	128,616	169,035	374,738	17,504	140,022	31,711	118,876	97,540	2,143,804
Per cent. of cars in shop	8.88	9.06	9.40	8.93	8.15	6.81	9.74	15.17	6.19	7.81	7.64	8.98
No. of freight engines owned	1,145	9,912	3,777	2,339	2,554	6,296	445	2,567	657	2,345	2,076	34,111
Av. cars on line per freight engine owned	68	68	82	55	66	60	39	55	48	51	47	63
Total freight-car mileage	38,636,105	424,136,587	146,091,061	73,319,679	100,997,877	223,192,011	19,974,494	73,017,871	22,319,938	90,319,466	67,506,432	1,279,511,521
Average miles per car per day	15.9	20.2	15.2	18.4	19.3	19.2	36.8	17.5	22.7	24.5	22.5	19.3
Per cent. loaded mileage	69.1	64.6	62.9	64.0	66.5	73.1	75.4	68.5	64.1	71.1	72.3	67.5
Ton-miles of freight, inc. Co. freight	411,344,443	6,063,313,346	1,827,487,871	860,777,671	1,162,869,144	1,655,892,496	319,753,936	860,982,994	218,125,877	1,346,058,153	813,425,478	15,540,031,409
Average ton-miles, including Co. freight:												
Per car-mile	10.6	14.3	13.2	11.7	11.8	11.7	16.6	11.8	10.1	14.9	12.0	13.1
Per loaded car-mile	15.4	22.1	20.9	18.3	16.8	16.6	22.0	17.4	15.7	21.0	16.6	19.7
Per car per day	169	288	211	216	226	228	627	207	228	366	269	254
Gross freight earnings	$4,450,447	$37,633,146	$11,171,501	$6,238,943	$8,046,085	$15,212,255	$2,320,820	$7,823,281	$1,867,274	$9,223,814	$5,858,846	$109,846,412
Average daily earnings: Per car owned	$2.04	$1.81	$1.29	$1.49	$1.54	$1.72	$4.73	$1.82	$2.33	$2.62	$1.96	$1.77
Per railroad-owned car on line	1.89	1.90	1.22	1.60	1.62	1.77	4.55	1.91	2.06	2.72	2.02	1.81
All cars on line	1.83	1.79	1.17	1.56	1.56	1.70	4.28	1.81	1.90	2.51	1.94	1.72

freight engine owned decreased from 65 in May, 1907, to 63 in May, 1908, indicating an improvement in the power situation. The effect of this improvement should appear in the car performance figures when there is a complete resumption of freight business."

Farm Value of Principal Crops.

The average value (based upon prices received by farmers) of the principal crops in the United States, on dates indicated, obtained from reports of correspondents of the Bureau of Statistics, Department of Agriculture, is as follows:

	1908.						
Crop.	Oct. 1.	Sept. 1.	Aug. 1.	July 1.	May 1.	Mar. 1.	Jan. 1.
Corn, per bush.	$0.723	$0.765	$0.781	$0.757	$0.647	$0.581	$0.540
Wheat, per bush.	.904	.887	.904	.895	.893	.892	.887
Oats, per bush.	.472	.472	.498	.502	.504	.479	.461
Barley, per bush.	.553	.561	.571	.581	.654	.668	.704
Rye, per bush.	.741	.728	.742	.754	.747	.745	.733
Buckwheat, per bush	.772	.800	.801	.860	.770	.724	.717
Flaxseed, per bush.	1.073	1.096	1.074	1.081	1.048	1.029	.999
Potatoes, per bush.	.748	.780	.836	.778	.733	.690	.634
Hay, per ton.	9.230	9.180	9.280	9.790	10.780	11.020	11.280
Cotton, per lb.	.090	.094	.103	.109	.096	.110	....

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Missouri, Kansas & Texas is in the market for six locomotives.

The Marshall & East Texas has bought two rebuilt consolidation locomotives from the Hicks Locomotive & Car Works.

The Chicago, Cincinnati & Louisville is asking prices on three observation parlor cars and four passenger coaches, and will later be in the market for additional coaches.

The St. Louis Southwestern has asked prices on a number of new locomotives, but no contracts have yet been placed and it is not likely that any new equipment will be bought before January 1.

The Chicago, Milwaukee & St. Paul, which was reported in the *Railroad Age Gazette* of Oct. 16 as being in the market for 50 prairie locomotives, has ordered 25 prairie and 13 ten-wheel locomotives from the American Locomotive Co., and 12 Atlantic locomotives from the Baldwin Locomotive Works.

The Ann Arbor, reported in the *Railroad Age Gazette* of August 28 as being in the market for locomotives, has ordered 10 consolidation locomotives from the American Locomotive Company.

General Dimensions.

Weight on drivers	191,000 lbs.
" on trucks	24,000 "
" total	215,000 "
" tender	162,000 "
" engine and tender	377,000 "
Cylinders	22 in. x 30 in.
Diameter of drivers	57 in.
Wheel base, driving	15 ft. 8 "
" " engine	24 " 4 "
" " engine and tender	59 ft.
Boiler, working steam pressure	200 lbs.
" diameter	80 in.
" total heating surface	3,500 sq. ft.
Tubes, heating surface	3,318 "
" outside diameter	2 in.
" number	425
" length	15 ft.
Firebox, length	108 in.
" width.	66 "
" heating surface	182 sq. ft.
" grate area	49.5 "
Tank capacity	8,000 gals.
Coal capacity	15 tons.
Valve motion	Walschaerts

CAR BUILDING.

The Wisconsin Central is asking bids on about 30 passenger coaches.

The Procter & Gamble Co., Cincinnati, has asked prices on 100 tank cars.

The Duluth & Northeastern will build 10 forty-ton flat cars at its Cloquet, Minn., shops.

The Missouri, Kansas & Texas is in the market for 29 passenger coaches of different types.

The Edgar Lumber Co., Wesson, Ark., has ordered one 25-ton box car from the Hicks Locomotive & Car Works.

The Colorado & Southern has ordered from the Pullman Company the two dining cars mentioned in the *Railroad Age Gazette* of October 16.

The Roumanian Government Railways are in the market for 500 freight cars. Some of them, it is understood, may be built in the United States.

The St. Louis Southwestern has been reported as in the market for new freight cars and material for building cars at its Pine Bluff shops. No definite plans have been decided on, however, and it is not likely that any new equipment will be bought before January 1.

The Georgia & Florida has ordered eight first class coaches and two combination passenger and baggage cars from the Hicks Locomotive & Car Works for early delivery. No contract has yet been placed for any freight equipment, for which this road has been reported in the market.

The Chicago, Milwaukee & St. Paul will build 2,500 fifty-ton gondola cars at its Dubuque and Minneapolis shops. The steel underframes and cast steel truck frames will be built by the Bettendorf Axle Co. With the 7,500 cars to be built at the Milwaukee shops, this makes a total of 10,000 cars for this road to be equipped with Bettendorf steel underframes and cast steel trucks.

The Harriman Lines, as previously reported in these columns, have ordered from the Pullman Co. 220 passenger cars, as follows: Seventy-seven steel baggage cars, 71 steel coaches, 11 steel postal cars, 9 steel postal storage cars, 10 steel chair cars, 30 steel underframe dining cars, five 60-ft. steel underframe combination cars with 30-ft. mail compartment, four 69-ft. combination cars with 20-ft. mail compartment, and three 60-ft. combination cars with 20-ft. mail compartment. All the cars are for delivery about January 1. The 77 baggage cars will be distributed as follows: Southern Pacific, 35; Central Pacific, 25; Union Pacific, 10; Oregon Short Line, 3; Oregon Railroad & Navigation, 2, and Oregon & California, 2. The 72 coaches will be distributed as follows: Southern Pacific, 30; Central Pacific, 20; Houston & Texas Central, 7; Oregon Railroad & Navigation, 6; Oregon & California, 5; Houston, East & West Texas, 3. Six of the 11 postal cars are for the Central Pacific and five for the Union Pacific and four of the nine storage postal cars are for the Central Pacific and five for the Union Pacific. The 10 chair cars are for the Union Pacific and the 11 diners will be distributed as follows: Union Pacific, 3; Oregon Short Line, 3; Oregon Railroad & Navigation, 3; Oregon & California, 2. The five 60-ft. combination cars with 30-ft. mail compartments are to be distributed as follows: Houston & Texas Central, 2; Texas & New Orleans, 1; Louisiana Western, 1; Galveston, Harrisburg & San Antonio, 1. Two of the four 69-ft. combination cars are for the Sonora Railway and two for the Cananea, Yaqui River & Pacific. The three 60-ft. combination cars with 20-ft. mail compartments will be distributed as follows: Phoenix & Eastern, 2; Gila Valley, Globe & Northern, 1.

IRON AND STEEL.

The Great Northern is in the market for 500 tons of structural steel for use in bridge construction.

The Ann Arbor has ordered 2,100 tons of rails from the Lackawanna Steel Co. for prompt delivery.

The Carolina, Clinchfield & Ohio has ordered 3,500 tons of bridge steel from the Pennsylvania Steel Co.

The Boston & Albany is said to be asking prices on 2,000 tons of structural steel for pier construction at Boston.

The Atchison, Topeka & Santa Fe has ordered 1,000 tons of tie plates from the Elyria Iron & Steel Co., Elyria, Ohio.

The Missouri, Kansas & Texas has ordered 3,300 tons of heavy rails from the Illinois Steel Co. for immediate delivery.

The Chicago, Milwaukee & St. Paul has ordered 700 tons of structural steel for bridge construction from the Wisconsin Steel Co., Chicago.

The Pennsylvania, according to press reports from Pittsburgh, Pa., as noted in another column, will soon place an order for rails for 1909 delivery.

The Illinois Traction has ordered 8,000 tons of bridge steel from the Pennsylvania Steel Co., for the bridge across the Mississippi river at St. Louis, Mo.

RAILROAD STRUCTURES.

Amarillo, Tex.—The roundhouse and shops of the Atchison, Topeka & Santa Fe at this point were destroyed by fire on October 19. Twelve engines were damaged and a number of loaded cars were burned. The loss is estimated at $200,000.

Chicago, Ill.—The Chicago & Alton has prepared plans for a new office and freight terminal building at No. 2 West Van Buren street, involving an expenditure of about $200,000. The new building will occupy the site of the present four-story structure just west of the river. The building will have a frontage of 174 ft. on Van Buren street and a depth of 60 ft., with two L's, each 40 ft. x 65 ft. Through the first story of the office building there will be a driveway leading to the warehouse in the rear. The plans provide for a six-story brick, fireproof structure, but it is not likely that over four stories will be built at present. In the rear of the office building there will be an inbound freight warehouse, 40 ft. x 600 ft. and two stories high, and an outbound freight warehouse one-story high, 30 ft. x 88 ft. The actual construction of this building will not be begun until next spring, although some preliminary work in the rearrangement of the tracks will be done this fall. When the office building is completed some of the departments now in the Railway Exchange building will be moved to these quarters.

At a meeting of the directors of the Chicago & North-Western at Chicago on October 15, the bids for the construction of the new passenger terminal were opened and considered. It was later announced that it will be some time before the name of the successful bidder will be made known. The bids received were from big contractors and include the George A. Fuller Co., C. E. Clark, Falknau Construction Co., C. T. Wells, C. W. Gindele Co., John Griffith Sons Co., William Grace Co., George W. Jackson, Inc., Wells Brothers, Hedden Construction Co., Thompson-Starrett Co., Clark Construction Co., Linquist & Illsley, Sumner-Sollitt Co. and the John Price Co. The completion of the Chicago terminal will necessitate the letting of nearly 100 separate contracts. (Oct. 2, p. 1068.)

Columbia, Mo.—The Missouri, Kansas & Texas will begin at once the erection of a new passenger station to cost $20,000.

Creekside, Pa.—The Buffalo, Rochester & Pittsburgh is building a gravity storage reservoir to furnish water for locomotives at Creekside, Pa. Contract has been given to the Otto Gas Engine Works, Chicago, for the erection of a bucket type coaling station at the same place. The construction of the storage reservoir includes a concrete dam 30 ft. high and 350 ft. long; all the work will be done by the company's forces.

Des Moines, Iowa.—The Des Moines, Iowa Falls & Northern has prepared plans for the construction of new shops at East Nineteenth street and Grand avenue, Des Moines. The building will be of brick and steel construction, about 100 ft. x 200 ft., and will cost, exclusive of machinery, $20,000. Work is to begin at an early date.

Goldfield, Nev.—The Tonopah & Tidewater has a site ready for new yards and a new station, on which work is to be pushed as rapidly as possible. The company will make terminal improvements at a total cost of $50,000.

Hayward, Cal.—See Oakland, Cal.

Hobart, Okla.—The Chicago, Rock Island & Pacific has prepared plans for a new station 24 ft. x 100 ft. The structure will be built of pressed brick.

Livermore, Cal.—See Oakland, Cal.

Minneapolis, Minn.—See Northern Pacific under Railroad Construction.

North Tonawanda, N. Y.—An officer of the New York Central & Hudson River writes regarding the new bridge at this place that the construction of the barge canal necessitates a change in the existing structure. The present structure consists of a series of deck plate girder spans, while the new structure will have a 240-ft. through span over the barge canal.

Oakland, Cal.—The Western Pacific is preparing plans for the construction of its passenger depot. It is expected that the work on this building will be begun about January 1. Plans have also been prepared for passenger stations at San Leandro, Cal., Hayward and Livermore. The stations at Livermore and Hayward will be of the same design, the architecture being a modification of the mission type, with wide arcades on both sides and at one end. They will have dimensions of 42 ft. x 81 ft. A freight station will also be erected at San Leandro. Bids on all these structures will be asked soon.

Oil City, La.—The railroad commission of Louisiana has approved the plans of the Kansas City Southern for a new freight and passenger station. Work on this structure will be begun at once.

St. Louis, Mo.—See Illinois Traction under Iron & Steel.

San Antonio, Tex.—The Galveston, Harrisburg & San Antonio has prepared plans for a new reinforced concrete freight depot to be built about two blocks west of the passenger station. The building will have dimensions of 75 ft. x 385 ft. and will be three stories high. The structure will be fitted with steel rolling shutters and will be fireproof throughout.

San Leandro, Cal.—See Oakland, Cal.

SUPPLY TRADE NOTES.

The New York sales offices of the Bethlehem Steel Co., South Bethlehem, Pa., are to be moved on November 1 from 100 Broadway to 111 Broadway.

The Franklin Manufacturing Co., Franklin, Pa., has established a western office at 1529 Railway Exchange, Chicago, in charge of E. R. Rayburn as Manager.

The Philadelphia office of the Raymond Concrete Pile Co., New York and Chicago, has been moved from the Arcade building to Suite 1330, Land Title building.

P. G. Kennett has been appointed Sales Agent at the Chicago office of the Eastern Granite Roofing Co., New York. Mr. Kennett was formerly Storekeeper at Saginaw, Mich., for the Pere Marquette.

The Scullin-Gallagher Iron & Steel Co., St. Louis, Mo., manufacturer of high grade steel castings, has during the entire past year had an average of four of its eight 20-ton furnaces in constant operation.

The Bethlehem Steel Products Co. has been incorporated by Archibald Johnson, President of the Bethlehem Steel Co., South Bethlehem, Pa., B. H. Jones and E. G. Grace. The new company is to be a sales company.

L. E. Butler, formerly with the United States Metallic Packing Co., Philadelphia, Pa., and later with the J. R. Long Paint Co., has been appointed to a position in the sales department of the Hicks Locomotive & Car Works, at the Chicago office.

There are now in service or in course of construction over 3,400 Schmidt locomotive superheaters, these being in use on 97 railroads. Wilhelm Schmidt, Cassel-Wilhelmshohe, Germany, is at the head of Schmidt's Superheating Co., Ltd., of London.

The Asbestos Protected Metal Co., Canton, Mass., has just received orders for asbestos protected metal for the covering of coaling plants on the Atchison, Topeka & Santa Fe at the following points: Canadian, Tex.; Belen, N. Mex., and Waynoka, Okla. The contractors are Rinner & Warren, Topeka, Kan.

The Transvaal Chamber of Mines, at Johannesburg, is to hold a prize competitive exhibition of drilling machinery early in 1909. The first and second prizes are to be about $20,000 and $5,000, respectively. The London secretary of the organization is at 202 Salisbury House, Finsbury Circus, London, E. C.

The American Car & Equipment Co., Chicago, is preparing to double the capacity of its plant at Chicago Heights. The company has finished the construction of a new blacksmith shop and has begun the erection of a large mill house. With the increased facilities and enlarged track space it will be able to take care of 500 cars at its own plant.

The American Car & Foundry Co., New York, has prepared plans for the erection of a new car wheel foundry at 2201 South First street, St. Louis, Mo., to cost $90,000. There will be three buildings. The main structure will be 134 ft. x 364 ft., one-story high; the core room will be a one-story structure, 36 ft. x 95 ft., and the cupola house will be three stories high with dimensions 36 ft. x 44 ft.

The Sheffield Car & Equipment Co., Kansas City, Mo., as previously mentioned in these columns, is erecting a new car repairing and rebuilding plant at Kansas City. The plant consists of two buildings, each 70 ft. x 90 ft., which are now about completed and ready for the installation of machinery. The company will make a specialty of rebuilding freight cars, including the reinforcing of steel underframes, and will have yard capacity for about 300 cars. It is expected that the plant will be in operation by November 1, employing about 200 men.

The Raymond Concrete Pile Co., New York and Chicago, has received a contract from the Metropolitan Street Railway, New York, for placing Raymond concrete piles in the foundation of the new car barns that are to be erected at Fifty-fourth street and Ninth avenue, New York. A contract has also been received from the United States Government for placing reinforced concrete piles in the Missouri river, near Elwood, Kan. These piles will be used for holding revetments in some river improvement work. Heretofore wood piles have been used, but on account of their short life it was decided to substitute concrete piles.

The Pullman Company, Chicago, has awarded to R. & S. Sollitt, Pullman building, Chicago, the general contract for the erection of a new shop building for the manufacture of steel cars. At present the company has a large shop which is used more for the erection of wooden cars and the new structure is designed as an addition to this building in order to facilitate the manufacture of steel equipment. It will be one story high, 450 ft. x 300 ft., of steel construction with pressed brick exterior and will cost $400,000. A contract for 500 tons of steel has been awarded to the Kenwood Bridge Co. A number of new shearing and punching machines and a 20-ton crane will be installed. It is expected to have the shop in operation by January 1.

At a meeting of stockholders of Ward Equipment Company, held at the office of the company, 141 Broadway, New York, on Monday, October 12, directors and officers for the ensuing year were elected. John E. Ward was elected President; Alfred W. Kiddle, Vice-President, and T. V. Bates, Secretary and Treasurer. A. E. Robbins was appointed eastern representative, and Henry G. Horn, western representative. The President reported that the company had been very much more successful in every way than he had predicted in his last report to the stockholders. The business of the company in both the car heating and ventilating departments is growing more rapidly than was expected, and the President was authorized to either purchase or erect a suitable building in the city of New York where both the offices and the warerooms of the company could be located; this building to be of sufficient size to take care of the growing business of the company.

TRADE PUBLICATIONS.

Ruberoid.—The October issue of this periodical, published by the Standard Paint Co., New York, contains an article on Ruberoid roofing as applied over tar roofings.

Direct and Alternating-Current Machinery.—A four-page folder calls attention to the direct and alternating-current machinery manufactured by Fairbanks, Morse & Co., Chicago.

Battery Wells.—The C. F. Massey Co., Chicago, has just published a catalogue which describes and illustrates, with both half-tone and line cuts, steel-concrete-composition battery wells and Anhydric concrete battery chutes.

Regulators.—An artistic pamphlet just issued by the Mason Regulator Co., Boston, Mass., contains descriptions, with half-tone illustrations, of a number of regulators and reducing valves for high and low-pressure steam lines, elevator service, pump lines, etc.

Box Car Loader.—The Christy Box Car Loader Co., Des Moines, Iowa, is calling attention to its box car loader by means of blotters of various colors, 9½ in. x 6 in., upon which are views of its machine. Facsimile testimonial letters from users of this equipment accompany the blotters.

Smooth-On Cements.—An instruction book, seventh edition, has just been issued by the Smooth-On Manufacturing Co., Jersey City, N. J. This book contains a large amount of information regarding these metal cements, several new ones being included. This instruction book will be sent by the company on request.

Brill's Magazine.—The October 15 issue of this periodical, published by The J. G. Brill Co., Philadelphia, Pa., contains a number of half-tone illustrations of the Brill exhibits at the recent Street Railway convention at Atlantic City, N. J. It also contains an article on the interurban system and cars of the Lewiston, Augusta & Waterville Street Railway.

Reinforced Concrete.—The Turner Construction Co., New York, has just issued quarterly bulletin No. 5, which describes the factories and warehouses of the Keuffel & Esser Co., which buildings are of reinforced concrete throughout. An inserted leaflet contains four diagrams showing the fluctuations of the cost of building material during the past six years.

Metal Plastering Laths.—The Northwestern Expanded Metal Co., Chicago, has just issued a small pamphlet which was prepared as a manual for plastering contractors. The use of the Kno-Burn expanded metal lath instead of ordinary wood lath, and of Portland cement, with or without lime, is said to have led to a demand for such information as is given in this pamphlet.

Steel Piling.—A mailing folder, just issued by the Wemlinger Steel Piling Co., New York, contains a number of illustrations showing views of this piling as used in construction work. One illustration shows a corrugated plate weighing 388 lbs., supported at the ends, and loaded in the center with a weight of 7,600 lbs. The total deflection is given as being only $1\frac{7}{16}$ in.

Steel Die Head.—The Landis Machine Co., Inc., Waynesboro, Pa., has recently issued a catalogue, a large portion of which is devoted to a detailed description of the Landis all-steel die head, which is the feature of all Landis bolt cutters. The catalogue also contains some illustrations and descriptions of bolt threading, pipe and nipple threading, nut tapping and special threading machines which are manufactured by this company.

Cranes.—The Whiting Foundry Equipment Co., Harvey, Ill., has issued an interesting bulletin illustrating a number of crane installations and other equipment furnished by it to various railroads. The types of cranes shown include electric traveling cranes, gantry cranes, transfer cranes, pillar cranes, jib and bracket cranes, etc. The detailed description of all the types of cranes manufactured by this company are shown in Catalogue No. 45.

Storage Batteries.—The Electric Storage Battery Co., Philadelphia, Pa., has issued a little four-page circular telling about the Chloride Accumulator and Eride battery for railroad signals. It was gotten out especially for distribution at the annual convention of the Railway Signal Association in Washington last week. A diagram shows that up to 1902 the company had installed batteries of but 150,100 watt hours; that

from 1905, when 2,003,000 watt hours had been installed, to October 1, 1908, the total installations were 12,287,000 watt hours.

Metal Lath, Steel Corner Bead, Steel Studding, etc.—A catalogue of 24 pages containing general information about the products of the General Fireproofing Co., Youngstown, Ohio, is being distributed. Herringbone expanded metal lath, Boston steel lath, Universal steel corner bead, Allumited steel studding, metal furring and other types of reinforcing are well displayed and described. The Allsteel furniture filing devices and complete equipments are a feature of the publication.

Metal Structures.—The Chicago Bridge & Iron Works, Chicago, engineer and contractor for metal structures, has issued a 64-page catalogue illustrating and describing some of the water towers, stand pipes, smoke stacks, grain tanks, bridges, riveted pipe, roof trusses, buildings, locomotive turntables and portable tie preserving retorts which it has manufactured and built for various railroads, industrial companies and municipalities. A detailed list is given of the 690 elevated tanks and stand pipes which have been erected. The list contains the names of 30 railroads. Tables are also given showing the properties of lap joints and double butt strapped joints.

Locomotive and Car Orders in India.

According to a consular report, $350,000 of a special rolling stock fund has been allotted by the Indian government to the Assam Bengal Railways. For this road, there have been ordered from England six engines for use on the hill sections and six tank locomotives. The latter will be used as pushers and for heavy switching. Eight new locomotives have just been turned out from the shops. Orders have also been given for other rolling stock, including 400 box cars equipped with vacuum brakes.

Ball Bearing Geared Jack.

To meet the necessity for a short lift jack of capacity sufficient to be used in replacing brasses on heavily-loaded forty and fifty-ton freight cars or passenger and Pullman coaches, the journal jack shown in the accompanying illustration has been designed and built by the Duff Manufacturing Co., Pittsburgh, Pa. This jack is of 25 tons capacity and has a lift of 4½ in. Being but 10 in. high, it is especially suitable for use either in the shop, on the repair track or on the road. The weight, including the lever, is 74 lbs., so that it can be easily carried on the locomotive or in the caboose. The jack is regularly equipped with the Duff improved ball bearings, similar to those used in the bridge and car jacks, but an interchangeable roller bearing may be supplied.

Duff Ball Bearing Geared Jack.

The American Society of Mechanical Engineers.

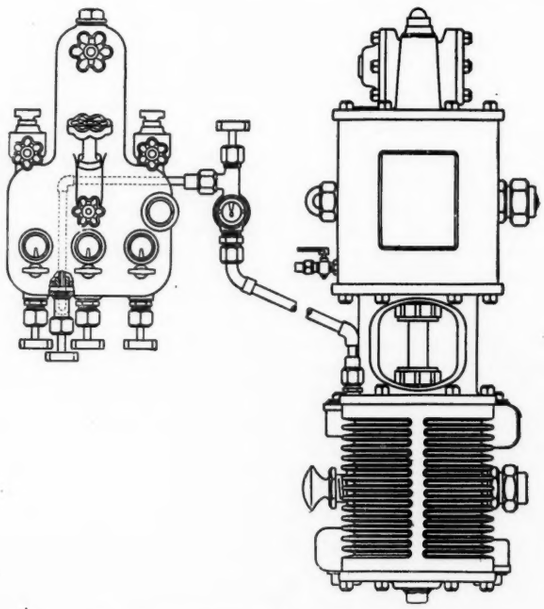
The November meeting of The American Society of Mechanical Engineers will be held in the Engineering Societies building, 29 West Thirty-ninth street, New York, on Tuesday evening, November 10. Franklin Phillips, President of the Hewes & Phillips Iron Works, Newark, N. J., will give an address on "The High Powered Rifle and Its Ammunition—Instruments of Precision," illustrated by lantern slides.

Car Foremen's Association of Chicago.

The annual meeting of the Car Foremen's Association of Chicago was held on October 12. About 400 of the 800 members were present. A dinner was given after the election of officers. The officers elected for the ensuing year are the following: President, P. H. Peck, Master Mechanic, Belt Railway of Chicago; First Vice-President, W. O. Davies, Jr., Foreman, Chicago, Milwaukee & St. Paul; Second Vice-President, W. F. Hall, Mather Horse & Stock Car Co.; Secretary, Aaron Klein; Treasurer, W. E. Sharp, Armour Car Lines.

Detroit Sight Feed Air Cylinder Lubricator.

The Detroit sight-feed air cylinder lubricator, made by the Detroit Lubricator Co., Detroit, Mich., has been designed to overcome the difficulty in securing proper lubrication of the air cylinders of locomotive air-brake pumps and the bad effects which otherwise result. This device, it is claimed, gives the engineman complete and convenient control of the lubrication of the air cylinder, and insures the use of proper oil. It consists of three parts: the emergency valve, the sight feed fitting, and the check valve connection. It is made in two styles: single feed and double feed patterns.



Detroit Sight Feed Lubricator.
Showing lubricator connected to a Westinghouse air pump.

The single feed style is for use on locomotives equipped with either a 9½-in. or an 11-in. Westinghouse air pump. The double feed style is for locomotives equipped with two Westinghouse pumps, with a New York duplex pump, or with a Westinghouse compound air pump.

The oil is supplied from the oil chamber of any of the Detroit bull's-eye type locomotive lubricators by the insertion of the emergency valve seen in the illustration between the first and second regular valves at the bottom of the lubricator. This opening ordinarily is closed by a plug. The emergency valve is not intended to be used as an oil-regulating valve, but as an emergency shut-off valve in the event of accident to or leakage in the supply pipe between this valve and the sight feed fitting.

The sight feed fitting, which is equipped with bull's-eye glasses, may be placed either to the right or left of the regular locomotive lubricator, or at any convenient point on the boiler head within reach of the engineman. The bracket by which these sight feed fittings are supported may be made from $\frac{5}{16}$ in. or ¼ in. x 1½ in. flat iron, or any other suitable material that may be at hand. A popular method of attaching is to give this bracket a quarter twist, and have suitable holes punched or drilled at both ends. The hole at one end can fit

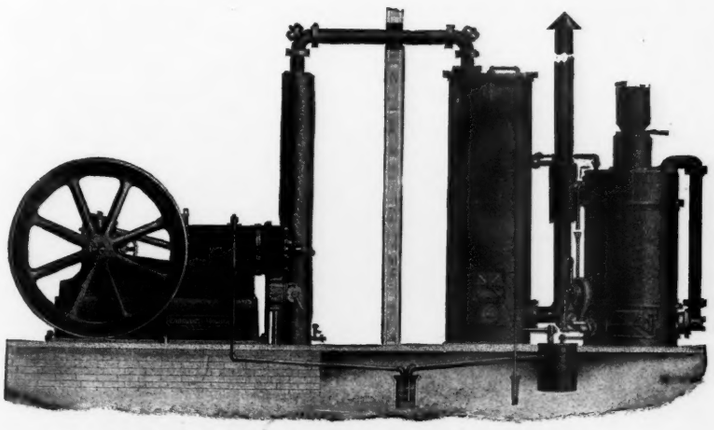
over the support post of the regular locomotive lubricator, the hole at the other end serving to support the sight feed fitting.

To prevent compressed air from entering the oil delivery pipe between the sight feed fitting and the air cylinder of the air pump, a check valve connection is provided, containing a ball check, seating upward. This check valve connection is screwed into the place occupied by the present oil cup. No trap must exist in the oil delivery pipe between the sight feed fitting and the oil inlet to the air cylinder, but a gradual decline should be maintained between these points, as the oil flows through this space by gravity and the suction created by the pump. On the other hand, there must be a trap formed between the regular lubricator and the sight feed fitting of the air cylinder lubricator, to prevent water from entering the oil supply pipe after all the oil has been fed from the oil reservoir of the regular lubricator. Therefore, if it is desirable to put the sight feed fittings at a lower point on the boiler head than the regular locomotive lubricator, the oil supply pipe should first extend upward to about the same height as the upper part of the oil reservoir of the regular lubricator, and then downward to the desired point. With this arrangement water cannot enter the oil supply pipe. A constant feed to the air cylinder is not advised; it is recommended that no more than ten drops of oil be fed at any one time, as experience has shown that the best results are obtained when a limited quantity of oil is fed, at intervals, according to the judgment of the engineman.

Suction Gas Producer Power.

That the producer gas plant will become as extensively used on railroads as it has in general commercial service is evident from the fact that this form of power can readily be applied to almost any service where a gasolene engine of 15 h.p. or larger can be used, where the work is not too intermittent, and where economy in attendance and fuel is essential. Indeed, it has even been found practicable in some instances to change gasolene engines of 20 h.p. and larger to work on producer gas, and the resulting economy has paid for the cost of these changes within a year.

There are now in general use on railroads hundreds of 15 to 200 h.p., or larger, gasolene engines and small steam plants which are looked after by section foremen, baggage men and others, which could be replaced by producer gas power to good advantage. They are in such service as depot and yard lighting, shops and important water stations, operating repair tracks, air compressors, etc.



Fairbanks-Morse Suction Gas Producer Plant.

The gas engine shows much better efficiency than any other heat engine and no elaborate plant is required to get this economy. Ordinary steam plants, in sizes 200 to 300 h.p. or smaller, convert about 6 per cent. of the fuel energy into useful work. With small steam plants the combined efficiency is often as low as 2 or 3 per cent. With the suction gas producer power plant, about 18 per cent. of the total energy of the fuel can be converted into useful work. It varies, according to conditions, from 15 to 21½ per cent. The following table shows comparative results of using various types of engines:

Comparative Cost of Fuel—100-*H.P. plants.*

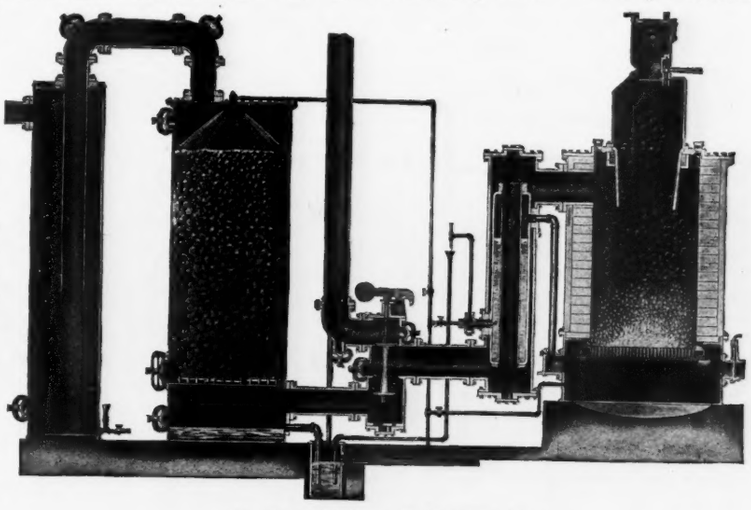
For producing 100 brake-horse-power, 10 hrs. per day, 310 days per year

Type of engine.	Fuel—Kind.	Fuel—Cost	Fuel consmptn per B. H. P., per hr.	Cost per B.H.P., per hr.	Cost per yr.	Saving per yr. using proder
Simple steam	Bitu. coal.	$3 per ton	8 lbs.	$0.012	$3,720	$2,751
Gas	Illum. gas.	60c., M ft.	18 ft.*	.0108	3,348	2,379
Gasolene	Gasolene.	13c. a gal.	1/10 gal.	.013	4,030	3,061
Gas	Natural gas.	30c., M ft.	13 ft.*	.0039	1,209	240
Producer gas.	Anthracite, coke or charcoal.	$5 per ton	1¼ lb.	.00313	969	.....

*The gas consumption is per cubic feet.

Advantages of the producer plant include simplicity, safety in its use, cost of attendance reduced to a minimum, no smoke stack and no smoke, relatively small amount of coal to be handled and stored and very few ashes to be disposed of, ease of starting, and comparatively small stand-over loss.

Anthracite, in buckwheat or pea sizes, lignite, coke and charcoal are the fuels commonly used. In many sections these small sizes of anthracite can be bought cheaply in car lots. The lignite producer offers cheap and reliable power in sections where this fuel is available and there are enormous deposits of lignite in many of the western states. Coke and charcoal are economical fuels in some sections and can be used separately or mixed with anthracite.



Sectional View of Gas Producer.

With anthracite, the fuel consumption usually varies from 1 lb. to 1¼ lbs. per brake horse-power per hour at about full load, according to conditions and the quality of coal used. While economy tests with high grade fuels, and also short run tests, often show a lower consumption than this, the above figures give a fair idea of what may be expected.

A series of tests were recently made with an anthracite producer and a 150-h.p. engine made by Fairbanks, Morse & Co., Chicago, for continuous runs of 24 hours, the object being to determine the comparative economy at different loads. The coal used was an ordinary grade of buckwheat Pennsylvania anthracite. The fuel consumption per brake horse-power hour at less than full load was found to increase per unit of power developed as follows: ¾ load, consumption 5.6 per cent. more per h.p. hour than at full load; ½ load, consumption 21.5 per cent. more per h.p. hour than at full load. As the ordinary engine in use has a load factor of from 50 to 75 per cent., the above figures indicate that the producer gas engine is exceedingly economical, even under light loads.

New Plant of the Chicago Railway Equipment Co.

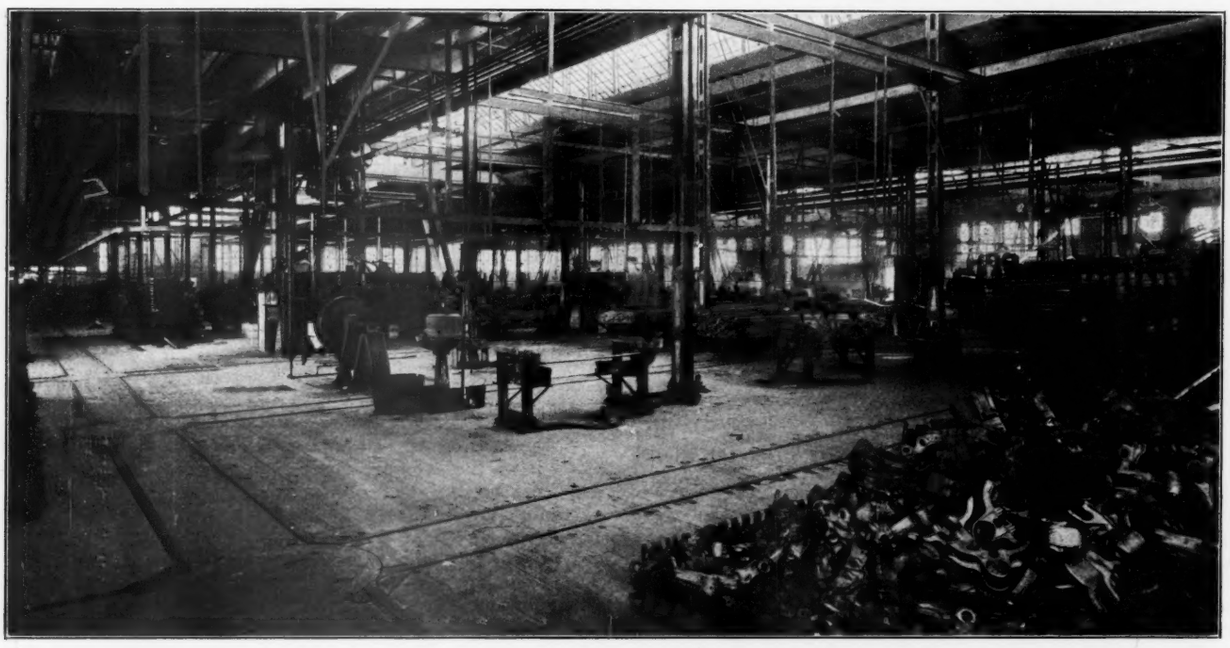
The new plant and office building of the Chicago Railway Equipment Co. is at Forty-sixth and Robey streets, Chicago. Prior to the first of the present year the company was at Fortieth street and Princeton avenue. The new plant was designed to produce maximum output at minimum cost, and the office building to give the employees all the conveniences and comforts usually found in such buildings.

The development of the company is interesting. The National Hollow Brake Beam Co. was founded in 1887 and began business in a small shop on the west side of Chicago. From this location it moved the following year to Fortieth street and Princeton avenue. The plant was enlarged in 1889 and further improvements were made in 1890. In 1893 the Chicago Railway Equipment Co. was incorporated as the lessor of the National Hollow Brake Beam Co. and finally succeeded it. The company's property, including the 20 acres surrounding its new location, consists of malleable iron plants at Marion, Ind., and Grand Rapids, Mich., and factories at Detroit, Mich., and Jersey City, N. J., comprising in all a total of 50 acres. The company, from time to time, added, by purchase, the National Hollow Brake Beam Co., the brake-beam business of the American Brake Beam Co., Kewanee Manufacturing Co., Monarch Brake Beam Co., Sterlingworth Railway Supply Co. and the Dexter Manufacturing Co. From making National hollow brake-beams only, it at present produces nearly every type of metal brake-beam, including the types known as Hollow, Creco, Diamond, Kewanee, Monarch, Sterlingworth, Reliance and Ninety-Six, and has developed many new and improved types of beams. Among its other specialties are side bearings, bolsters, slack adjusters, journal boxes, malleable castings, etc.

The office building is brick, with stone trimmings. It fronts on Forty-sixth street and is separate from the shop buildings. It is a three-story, fireproof building, 77 ft. 8 in. x 107 ft. On both sides and in front its appearance is enhanced by well kept grass plots which extend from the sidewalk to the building. The plant is surrounded by a wrought iron fence supported by brick posts, designed to harmonize with the architecture of the buildings.

The first floor of the office building includes the physical laboratory, exhibit room and brake-beam museum, temporary tool machine shop, tool vault, vestibule and lobby. In the testing laboratory are two Riehle testing machines, one of 20,000 lbs. capacity and the other of 100,000 lbs. capacity, the latter recommended by the Master Car Builders' brake-beam committee of 1906 for making brake-beam tests. This particular machine has been improved by the addition of supports, this feature being covered by patents owned by the Chicago Railway Equipment Co. The machine is arranged so that the brake-beam heads rest upon blocks that can be swung to give the equivalent of any height of hanging on cars and also make it possible to test the beams with torsional loads similar to those resulting from misapplication of the beams. An interesting feature of the office building is the exhibit room on the main floor, in which brake-beams of all types are shown. The beams displayed cover the history and development of the brake-beam business. The rear portion of the main floor is at present used as a temporary

Plant and Office Building; Chicago Railway Equipment Company.



Interior of Erecting Shop; Chicago Railway Equipment Company.

tool machine shop, but it can readily be converted into comfortable offices.

The second floor contains private offices and ante-rooms, separated from the main general offices by a corridor in the center of the building. All of the offices are outside rooms, having ample light and ventilation. A special feature of this building is the system of vaults. The general office vault extends through all three floors of the building, a spiral metal stairway connecting the different vault floors. All of the vault equipment is of metal, including the files and tables. In front of the general vault is the executive's and cashier's vault. A large stationery room and toilet rooms are on the second floor.

A large drafting room, with its electric blue-printing machine, is on the third floor. The tracings and records of the drafting room are kept in the third floor of the general vault. On the west side of this floor is an attractive and commodious cafe where luncheon is furnished the office force. A private dining room for the officers of the company, and for guests, adjoins the cafe.

The interior of the building has the "Tiffany" wall finish, which is a covering of cloth, painted, and the whole protected by a coating of transparent paste. To clean it the paste is washed off and another coat applied. The building is equipped throughout with the vacuum cleaning system of the American Cleaning Co., of Milwaukee, Wis.

The shop buildings are the double monitor type. The erecting shop is 160 ft. x 600 ft., its capacity being ample for business for some time to come. The plan is such that when it is outgrown it may be duplicated readily; in fact, a part of this addition has been built already. The arrangement of the erecting shop is such that the raw material is taken in at one end and progresses through to the opposite end, where the finished product is turned out. Special provision has been made for repairing brake-beams. This feature of the company's business was a source of considerable trouble in the old plant on account of the contracted quarters and large amount of room necessary to dismantle and rebuild damaged brake-beams of the trussed type. In the new plant a generous amount of space is allowed for this work and the erecting benches are arranged so that the tearing down and rebuilding of the beams is greatly facilitated, and kept from interfering with the building of new beams. Repair work will be an important feature of the plant in the future, and in this work a repaired beam will receive the same final tests as a new beam.

An extensive buggy system is in use for distribution of materials, etc. Tracks are laid to every point and machine where needed and turntables are at all intersections. As an example of the convenience of this system, a large portion of the malleable castings used in the brake-beams are placed in the buggies when unloaded from the cars, are taken to a drop machine, and after passing through the same are put in another buggy. The latter with the finished heads is then moved to the erecting benches and the heads removed only when beams are being built. The "National Hollow" pipe is handled similarly to the punching and slotting machines. Although a large amount of the stock has to be stored, the greater portion of the stock handled in course of the year's business is kept constantly moving in the buggies and the expensive rehandling, loading and unloading of stock that was necessary at the old plant because of the limited room is avoided. The buggies are of several designs and are built with and without removable sides.

In the east side of the erecting shop are two 75,000-lb. steam testing machines, over which every trussed beam passes in the course of manufacture. The test given to the trussed beams not only shows up any defects of construction and faults of material, but seats the various parts of the composite structure into a harmonious, practically integral, structure. The inspection benches near the drops are provided with M. C. B. gages, adopted as a result of the 1906 brake-beam report.

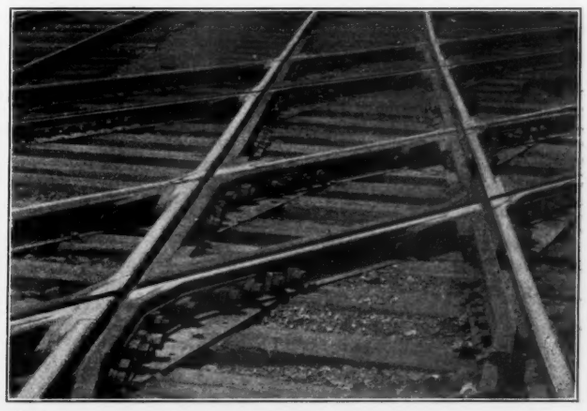
The Bowser system of oil storage is used. The tank supplying the bolt oil has a capacity of 340 gals., and the tanks for the machine and cylinder oils hold 120 gals. each. The fuel oil is stored in a 10,000-gal. tank. The shop is heated by the Van Auken steam system. The office building and the shop have all modern sanitary conveniences. The wash basins in the shops are interesting. The basin is divided into two compartments, the faucet emptying into the rear one. From this the water overflows into the front compartment, which, by means of a tube in the outlet, is kept skimmed of grease that collects on the water. The workmen are supposed to wash in the front compartment first, and after the worst of the dirt is removed, clean water ready for immediate use is in the rear compartment without the usual delay of drawing fresh water. The most modern type of metal lockers is provided for the workmen.

The power house is just north of the shop building. The equipment consists of two Wickes vertical tube, 150-h.p. boilers; two Deane 7½-in. x 5-in. x 6-in. boiler feed pumps, equipped with Fisher governors; a Westinghouse 100-h.p. automatic engine, direct-connected to a Crocker-Wheeler 75-k.w. generator; a New York Safety Steam Power Co.'s 45-h.p. engine, driving a General Electric 30-k.w. generator; an Ingersoll-Rand air compressor with a capacity of 374 cu. ft. of free air per minute; vacuum cleaning system of American Cleaning Co.; two Marsh steam vacuum pumps, 5 in. x 8 in. x 10 in., built by the American Steam Pump Co., Battle Creek, Mich., for use on the Van Auken vacuum system of steam heating, and one Underwriters' fire pump, 16 in. x 9 in. x 12 in., built by the Knowles Steam Pump Works, with a capacity of 750 gals. per minute.

The plant was designed and built by Westinghouse, Church, Kerr & Co., New York, and the interior decoration of the office building was done by the W. P. Nelson Co., Chicago.

Wharton Manganese Steel Crossing.

The photograph shown herewith was taken at Dillerville, Pa., in June, 1907. It shows a manganese steel crossing on the Pennsylvania Railroad, at the intersection of the main line and the Columbus branch. This crossing was placed in the track in June, 1902, and it is still in service. It is said that Bessemer rail crossings formerly used at this place had an average life of three months, while this manganese steel crossing has been in service for six years and under a constantly increasing traffic.



Wharton Manganese Steel Crossing.

While the first cost of crossings made of this metal is several times as great as the ordinary built-up Bessemer steel crossing, the results obtained, as mentioned above, in comparative wear of the two metals would seem to justify the additional expense. This crossing shown was built by Wm. Wharton, Jr., & Co., Inc., Philadelphia, Pa.

Outlook for Pennsylvania Equipment Orders.

Press reports from Pittsburgh, Pa., quote President McCrea, of the Pennsylvania, who is this week making an inspection trip in company with the board of directors, as follows: "The Pennsylvania will soon place an order for rails and equipment for 1909 delivery, the order to be about the same size as usual. The company will not let its lines deteriorate in any way.

In regard to the business world the worst is over and there will be improvement from now on. It will not be sudden, but gradual and sure. The future condition of the railroads will depend much on what is accomplished in other lines of activity. The decrease in earnings of the Pennsylvania averages at present from 18 to 20 per cent. below this time last year."

Weed Killing Contract.

John V. Pearse, General Manager of the Railway Chemical Sprayer Co., Owensboro, Ky., has made a contract to kill weeds on at least 3,000 miles of government railroad in Queensland each year for a period of five years. Payment is to be made at $15 per mile, making the minimum amount of the whole contract $225,000. The contract was made with a representative of the Queensland government and is subject to confirmation by the government.

Street Railway Convention Exhibits.

Among the exhibits at the street railway convention at Atlantic City were those of the following companies:

Adams & Westlake Co., The, Chicago.—Arc and incandescent headlights, signal lamps for every branch of the service, hand lanterns, brake handles, car trimmings, baggage racks, switch locks. Represented by W. H. Baldwin, B. L. Compton, J. A. Foster, F. N. Grigg, E. L. Langworthy, G. L. Walters.

Allis-Chalmers Co., Milwaukee, Wis.—Operating exhibit of the various types of air-brakes and parts, steam turbine parts, pictorial exhibit of other products. Represented by F. C. Randall, J. F. Dixon, H. W. Rowley, Harry Byrne, A. P. Peck, W. G. Clayton, J. T. Cunningham, St. John Chilton, J. B. Nicholson, S. H. Payne, J. M. C. Lucas, A. H. Whiteside, J. R. Jeffrey, J. H. Denton, W. A. Crawford, I. L. Dimm, W. S. Heger.

American Blower Co., Detroit, Mich.—One No. 7 high-pressure blower holding a ball in suspension in the air column, "ABC" dynamic blower, "ABC" disc fan blower, volume blower, "ABC" vertical, self-oiling engine direct-connected to a Westinghouse generator, "ABC" sectional hot blast steam heating coil, Vento radiation. Represented by Clayton W. Old, Arthur Ritter, E. Morris Lloyd.

American Brake Co., St. Louis, Mo.—Sectional slack adjuster, connected to a brake cylinder. Represented by E. L. Adreon.

American Brake-shoe & Foundry Co., Mahwah, N. J.—Brake-shoes, brake heads. Represented by Otis H. Cutler, J. B. Terbell, W. S. McGowan, F. L. Gordon, F. W. Sargent, J. S. Thompson, E. L. Janes, C. C. Higgins, L. R. Dewey, F. H. Coolidge, R. E. Holt, E. B. Smith, R. M. Brower, G. R. Law.

American Locomotive Co., New York.—Electric motor and trailer trucks. Represented by William Wampler, W. E. Woodard, Raymond H. Baker.

American Mason Safety Tread Co., Boston, Mass.—American Mason Safety Tread, lead and carborundum filled, Karbolith composition flooring for cars and buildings. Represented by Henry C. King, L. H. Myrick, J. W. Scott.

American Railway Supply Co., New York.—Cap badges, coat badges, police badges, uniform buttons, metal fare tickets. Represented by Walter Chur.

American Steel Foundries, Chicago.

American Steel & Wire Co., Chicago.—Bare and insulated wires and cables, rail bonds and rail bond tools, springs, wire rope and strand, woven wire fence, concrete reinforcement. Represented by F. Baackes, C. S. Knight, Jr., G. A. Cragin, F. A. Keyes, C. R. Sturdevant, R. K. Sheppard, J. D. Sutherland, A. G. Greenberg, R. H. Pratt, B. H. Ryder, G. C. Kiefer, L. A. Dietrich, E. W. Vaughan, Chas. Larson, B. B. Ayers.

Atlas Railway Supply Co., Chicago.—Atlas standard rail joints, Atlas straight, compromise, insulated, special, and anchor joints for concrete construction, Atlas braces, Atlas tie plates, Atlas switch stand, Atlas primer and surfaces for cars. Represented by J. G. McMichael, G. M. Huber, D. Thomson.

Baldwin Locomotive Works, Philadelphia, Pa.—Baldwin trucks. Represented by John R. Dickey, Charles Riddel, Holstein De Haven Bright, Harry W. Sheldon, Fred. W. Weston.

Bethlehem Steel Co., South Bethlehem, Pa.—Open-hearth steel rails, standard and special section rails in high carbon and alloy steels, special wide flange I-beams and girders, beams, tool steel, drop forgings, hydraulic jacks. Represented by Frederick Conlin, L. H. Atkinson, A. D. Mixsell, W. B. Kennedy, G. H. Blakely.

Bowser & Company, Inc., S. F., Fort Wayne, Ind.—Oil storage equipment. Represented by C. A. Dunkelberg, A. D. Wyckoff, E. S. Taylor.

Brill Company, The J. G., Philadelphia, Pa.; American Car Co., St. Louis, Mo.; The G. C. Kuhlman Car Co., Cleveland, Ohio; John Stephenson Co., Elizabeth, N. J.; Danville Car Co., Danville, Ill.; Wason Manufacturing Co., Springfield, Mass.—Brill high-speed truck No. 27-E3, Brill city and suburban short-base truck No. 27-GE1, Brill center-bearing maximum-traction truck No. 39-E, a pay-as-you-enter type car for Third Avenue Railroad, New York City, mounted on Brill center-bearing maximum-traction trucks No. 39-E, section of Brill convertible car with Brill "Narragansett" sill steps, five sections of Brill semi-convertible cars, showing twin-window arrangement, car seats, seating material, springs, track scrapers, platform gong, and other patented specialties, including the improved Brill "Noiseless" brake-hanger. Represented by S. M. Curwen, W. H. Heulings, Jr., J. W. Rawle, G. H. Tontrup, G. M. Haskell, D. B. Dean, A. N. Hargrove, F. L. Markham, J. E. Brill, B. O. Brill, F. W. Brill, E. B. Bronenkamp, S. T. Bole, W. J. Mackie, H. D. Haddock, R. B. Liddell, C. F. Rice, L. A. Kling, C. V. de Jong.

Carnegie Steel Co., Pittsburgh, Pa.—Steel cross ties, piece of track laid with steel ties embedded in concrete, Duquesne rail joints, frog fillers, Schoen solid forged and rolled steel wheels, process of manufacture and examples of various types, Schoen solid forged and rolled steel gear wheels, steel sheet piling cofferdam. Represented by W. P. Siebert, John C. Neale, N. M. Hench, R. B. Woodworth, J. C. C. Holding, C. G. Bacon, Jr., F. E. Spencer, L. P. Lincoln, James B. Bonner, George Summers, Harry Summers, R. P. Hutcheson, W. N. Jeffrees, W. L. Hoffman, William Breeden, Roscoe Bowen, W. W. Baker, J. H. Henry, C. B. Yarnell, E. B. Blandy, F. C. Deming, K. E. Porter, C. B. Friday.

Chicago Pneumatic Tool Co., Chicago.—Electric drills, electric hoists, electric grinders, spike-driving electric drill, air compressor, air tools, vacuum cleaners. Represented by W. O. Duntley, Thomas Aldcorn, G. A. Barden, F. C. Severin, W. F. Heacock, Charles Booth, W. P. Pressinger, H. B. Griner, C. B. Coates, Howard Small.

Chisholm & Moore Manufacturing Co., The, Cleveland, Ohio.—Chain hoists and trolleys. Represented by H. E. Dickerman.

Cincinnati Car Co., Cincinnati, Ohio.—Pay-as-you-enter car for Municipal Traction Co. of Cleveland. Represented by H. C. Ebert, Robert Dunning, A. N. Stump.

Cleveland Frog & Crossing Co., The, Cleveland, Ohio.—"Hard Service" manganese crossing, girder rail tongue switches, mate and frog, T-rail double spring frog, low target switch stand, combination joint, removable hard center plates. Represented by G. C. Lucas, A. P. Ruggles, George Stanton.

Climax Stock Guard Co., Chicago.—Clay and steel cattle guards, models of three styles of farm crossing gates, automatic car counting electric signal, full line of ticket and conductors' punches, samples of full line of expanded metal, metal lath and reinforcing material, metal clothes locker. Represented by Fred V. Stewart, C. P. Nachod, E. C. Vehslage.

Consolidated Car Heating Co., Albany, N. Y.—Electric heaters and switches, trolley voltage signal bell system, crossing signal. Represented by Cornell S. Hawley, W. S. Hammond, Jr., Thomas Farmer, Jr., Geo. H. Diack.

Cook's Standard Tool Co., Kalamazoo, Mich.—Climax track drill, standard track tool grinder, magic high-speed flat bit, Cook combination chuck. Represented by Eugene Cook.

Curtain Supply Co., Chicago.—Frames of curtains equipped with ring Nos. 88 and 89 fixtures for semi-convertible cars, ring fixtures for open cars, Forsyth No. 86 roller tip fixtures, Forsyth & Acme open car cable fixtures, curtain materials of all kinds. Represented by R. F. Hayes, S. W. Midgley.

Dearborn Drug & Chemical Works, Chicago.—"The most novel and complete Street Railway Amusement Park in the world." Represented by Robert Carr, Wm. B. McVicker, Grant W. Spear and H. G. McConaughy.

Dixon Crucible Co., Joseph, Jersey City, N. J.—Special steel exhibition building. Dixon's Ticonderoga flake graphite oil, Dixon's lubricants, Dixon's silica graphite paint, photographs, a lead pencil 10 ft. long. Represented by DeWitt C. Smith, L. H. Snyder, J. A. Condit, John J. Tucker, Thomas Findlay.

Duff Manufacturing Co., The, Allegheny, Pa.—Barrett track jacks, automatic lowering jacks, Duff ball-bearing screw jacks, pit jacks, armature lifts. Represented by George A. Edgin, Thomas A. McGinley, E. F. Dengel.

Edwards Company, The O. M., Syracuse, N. Y.—Car window fixtures, sash balances, metal sash, tin barrel spring rollers, steel trap doors for car vestibules, trap door fixtures. Represented by O. M. Edwards, Edw. F. Chaffee, Franklyn M. Nicholl, Geo. G. Norris, C. H. Rockwell.

Edwin R. Kent & Co., Chicago.—Allen's solid stag manganese steel frogs and crossings. Represented by Edwin R. Kent, J. T. Stafford, George Brown, Fred Lieferman.

Electric Storage Battery Co., Philadelphia, Pa.—Samples of the Chloride Accumulator, diagrams of new split-pole rotary converter, used for regulation of alternating current loads, curves showing the regulation, and an average adjuster. Represented by Charles Blizzard, J. L. Woodbridge, G. H. Atkin, Albert Taylor, H. B. Gay, Edw. L. Reynolds.

Flake Graphite Products Co., New York.—Flake graphite products and paints. Represented by C. H. Spotts.

Forsyth Bros. Co., Chicago.—Metal sash, steel posts for wood or steel cars, sanitary hand strap, deck sash ratchets. Represented by A. L. Whipple.

Galena-Signal Oil Co., Franklin, Pa.—Reception and tea-room, waste-saving machine and filter. Represented by L. G. Miller, Geo. A. Barnes, Geo. C. Miller, E. V. Sedgwick, L. J. Drake, Jr., Chas. H. Thomas, C. E. Schauffler, J. V. Smith, C. A. Record, W. A. Trubee, L. R. Speare, E. C. Beatty, R. W. Cunningham, Alfred Green, W. A. Love, W. H. Lee, W. A. McWhorter, W. O. Stieff, Geo. J. Smith, J. E. Southwell, W. P. Westcott, William Walsh, H. A. Mason, B. C. Gesner, Geo. L. Morton.

General Electric Co., Schenectady, N. Y.—Type M automatic control for four 75 h. p. motors, US-13 trolley base with 12-ft. trolley pole and Form 21 fork with wheel, trolley forks and wheels for various speeds, MR-12 circuit breaker, MS-8 switch, K-35, K-36, K-34 controllers with handles, MA-13 and MA-14 fuse boxes, DB-160, DB-166, DBA-176, and DBA-168 contactors, switchboard panel for Type M control, car light regulator, emergency straight air brake equipment with CP-21 compressor for motor car, emergency straight air brake equipment for trailer car mounted on rack for operation, motorman's valves, emergency valve, MC governor, split, solid and forged rim gears, cast-steel center for gears, armature and field coils, commutator segments, armature linings for GE-216 motor, Grade F pinion, section of GE field coil to exhibit effect of vacuum compound treatment, GE-207, 600-1200-volt railway motor, GE-216, GEA-611, GEA-506 and 205 railway motors, rail bonds, catenary and standard direct suspension line material, electrolitic car lighting arresters. Magnetite headlight complete, self-contained solenoid-operated circuit-breaker arranged for 650-volt operation, a. c. and d. c. rotary converter panels. Represented by C. E. Sprague, C. C. Pierce, J. J. Mahony, H. D. Hawks, W. J. Clark, R. E. Moore, E. H. Ginn, H. C. Marsh, W. J. Hanley, H. L. Monroe, G. D. Rosenthal, Gen. Irving Hale, J. R. Lovejoy, J. G. Barry, C. E. Barry, H. N. Ransom, W. B. Potter, F. E. Case, E. D. Priest, A. H. Armstrong, E. H. Anderson, G. H. Hill, A. V. Thompson, F. H. Gale, Mr. Corbin, Mr. Buell.

General Storage Battery Co., Boonton, N. J.—Storage battery plates, jars, tanks and accessories in various sizes, "Bijur" regulator and switchboard. Represented by Joseph Bijur, James Dixon, Edward Lyndon.

Gold Car Heating & Lighting Co., New York.—Gold's improved electric car heaters, junction boxes and parts. Represented by E. E. Gold, E. B. Wilson, J. M. Stayman, F. T. Kitchen, F. Cahill.

Goldschmidt Thermit Co., New York.—All appliances used in rail welding and the repair of motor cases and truck frames by the Thermit

process, samples of metals manufactured by the alumino-thermic process and samples of rail welds, pipe welds and compromise joints. The company gave daily demonstrations of Thermit welding. Represented by G. E. Pellissier, W. R. Hulbert.

Gould Storage Battery Co., New York.—One type U cell, 1 type S cell, 1 type O cell, lead-lined tank, 10 type WS couples, 12 type W couples. Represented by H. N. Powers, C. H. Bradley, H. W. Brow.

Johns-Manville Co., H. W., New York.—Catenary overhead line material, asbestos wood, indurated fiber, third-rail insulators, battery jars, low-tension overhead line material, electrobestos arc deflectors, high-tension transmission porcelain insulators, Noark enclosed fuses, molded mica sockets, friction tape and splicing compound, electric car heaters, asbestos pipe and boiler covering, asbestos roofing and packing. Represented by T. F. Manville, J. W. Perry, T. L. Barnes, S. G. Meek, E. E. Schmid, J. McSorley, C. N. Manfred, H. M. Voorhis, G. A. Saylor, H. M. Frantz, R. R. Braggins, W. W. Power, C. W. Schultz, E. B. Hatch, W. H. Kempton.

Kennicott Water Softener Co., Chicago Heights, Ill.—Model of machine, framed photographs and stereopticon. Represented by Chas. L. Kennicott, Frank S. Dunham.

Kinnear Manufacturing Co., Columbus, Ohio.—Steel rolling car house doors. Represented by F. B. Billheimer, S. R. Hewitt, F. C. Schmidt.

Lackawanna Steel Co., New York.—Abbott rail joint; Lackawanna sheet steel piling; open-hearth Bessemer T-rails; structural steel shapes; twisted square bars for reinforced concrete construction; sheared and universal shapes; axles; Maxwell deformed concrete bar; shoulder tie-plates; sections of I-beams, channels, angles, rounds, flats, sheets, bars and special shapes; sections of standard rails, light rails, contact rails, splice bars, fishplates, patent rail joints, tie plates, billets, squares, brake-beams, sheet steel piling. Represented by R. L. McDuffie, Frank Abbott, H. Sanborn Smith, Guy Hagar, D. H. Van Pelt.

McConway & Torley Co., The, Pittsburg, Pa.—Janney radial coupler equipment, working models. Represented by Stephen C. Mason, E. M. Grove, H. C. Buhoup, I. H. Milliken.

Milburn Company, Alexander, Baltimore, Md.—Milburn lights for construction and track work, portable acetylene lights, and generators. Represented by A. F. Jenkins, B. Surjack.

National Lock Washer Co., The, Newark, N. J.—National cam curtain fixtures, National balance protected groove curtain fixtures, National sash lock, National sash balance, complete window fixtures, full size working models, samples of National lock washers. Represented by F. B. Archibald, W. C. Dodd, D. Hoyt, J. B. Seymour.

New York Switch & Crossing Co., Hoboken, N. J.—Anti-straddling tongue switches, frogs and crossings, hard steel center construction, manganese and hammered steel centers. Represented by W. C. Wood, H. R. Sherman, W. B. Phillips, E. Armerding.

Pantasote Company, The, New York.—Pantasote car curtains and seating materials, Agosote headlinings, panels, partitions, etc. Represented by John M. High, Douglas E. Bonner, Geo. N. Boyd.

Quincy, Manchester, Sargent Co., Plainfield, N. J.—Stanwood step, pit jack, Bonzano rail joint, Samson girder, rail bender, pneumatic hoist. Represented by C. H. Holbrook.

Rail Joint Company, The, New York.—Rail joints. Represented by B. M. Barr, D. J. Evans, C. A. Cool, G. W. Smith.

Ramapo Iron Works, Hillburn, N. Y.—Manganese steel rolled rails, and switches, frogs, switch stands, etc. Represented by W. L. Derr, W. B. Lee, Arthur Gemunder, Jas. B. Strong.

Standard Paint Co., The, New York.—Reception room. Represented by J. G. Satterthwait, Paul J. McCarley, Charles E. Smith.

Standard Steel Works Co., Philadelphia, Pa.—Solid rolled steel wheels mounted on open-hearth hammered steel axles; steel springs. Represented by Clarence F. Dodson, H. W. Sheldon, Fred W. Weston, E. Sidney Lewis, H. de H. Bright, A. A. Stevenson, Robert Radford, Charles Riddell.

Stromberg-Carlson Telephone Manufacturing Co., Rochester, N. Y.—Magneto despatching telephones, central energy despatching telephones, and kindred equipments. Telegraph signals manufactured by Telegraph Signal Company, Rochester, N. Y. Represented by J. O. Oliver, H. W. Lucia, E. O. Munson, H. C. Slemin.

Symington Co., The T. H., Baltimore, Md.—Journal boxes, dust guards, ball-bearing center and side bearings. Represented by J. F. Symington, C. J. Symington, Donald Symington, T. C. de Rosset, A. H. Weston.

U. S. Metal & Manufacturing Co., New York.—Victor Nos. 2, 3, and 4, and Perfect Nos. 1 and 2 car replacers, St. Louis Surfacer and Paint Company's products, Hillman locked clevis and turnbuckle, Columbia lock nuts, Continental whistling post, Wright wrenches, brake-jaws. Represented by B. A. Hegeman, Jr., G. L. L. Davis, F. C. Dunham, Fred Atwater.

Underwood & Co., H. B., Philadelphia, Pa.—Car truck side frame facing machine, pneumatic pipe bender, portable crank pin turning machine, portable cylinder boring car in a cylinder, vacuum dash pots, St. John self-adjusting cylinder packing. Represented by E. J. Rooksby, D. W. Pedrick, 2d, Edmund Crawford.

Watson Stillman Co., The, New York.—Hydraulic machinery. Represented by Edward A. Johnson.

Western Electric Co., New York.—Overhead material, pole brackets, armature and field coils, commutators, arc lamps, safety strain insulators, high-tension and third-rail insulators, Kalamazoo trolley wheels, headlights, deltabeston coils and wire. Represented by A. E. Melxell, H. M. Post, F. Killion, M. A. Oberlander, R. Roth, F. C. Jaeger, R. H. Harper.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.—Standard d. c. No. 101-B, 40-h.p. motors; d. c. No. 306, 50-h.p. motor of interpole type; No. 156, 150-h.p. motor, union switch system of control for use on d. c. and a. c. railways, single phase motors. Represented by J. A. Brett, W. N. Conwell, C. S. Cook, Thomas Cooper, C. H. Davis, H. P. Davis, T. W. Ewing, G. B. Griffin, W. M. McFarland, L. N. Reed, C. W. Register, H. C. Stier, C. B. Humphrey, J. C. McQuiston.

Westinghouse Machine Co., East Pittsburgh, Pa.—Represented by E. H. Sniffin, L. L. Brinsmade, L. C. Bullington, H. H. Van Blarcom, J. H. Wagenhorst, R. E. Adreon, G. M. Bates.

Wharton, Wm., Jr., & Co., Inc., Philadelphia, Pa.—Switches, mates, frogs, and crossings of solid and renewable center types of manganese steel contsruction; "restored" manganese steel frog; solid manganese steel T-rail. Represented by V. Angerer, W. McLain, Arthur S. Partridge, J. C. Robinson, James W. Stringfellow, A. Gilpin, George R. Lyman, H. F. McDermott.

Wheel Truing Brake-Shoe Co., The, Detroit, Mich.—Abrasive brake-shoes. Represented by J. M. Griffin.

Wilson, James G. Manufacturing Co., New York.—Rolling steel doors for car houses, trolley wire device for carrying current and special safety groove and lock for wide doors. Represented by A. H. Dodge.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

H. H. Rogers has been elected President of the Virginian Railway, succeeding W. N. Page.

J. S. Peter, Acting General Manager of the San Antonio & Aransas Pass, has been elected First Vice-President and General Manager.

H. L. Harmon, President of the Kansas City Terminal Railway, has been elected also President of the Kansas City Belt Railway, succeeding J. E. Hurley.

D. M. Cameron, whose resignation as Auditor of the Illinois Southern was announced in our issue of October 9, remains Auditor of the Southern Indiana.

W. S. Throop, Division Claim Agent of the Erie at Buffalo, N. Y., has been appointed Assistant Claim Agent, a new office, with headquarters at New York. G. F. Collette succeeds Mr. Throop.

R. Lea Barnes has been elected Assistant Treasurer of the Oregon Railroad & Navigation Co., with office at the United States National Bank, Portland, Ore., succeeding J. W. Newkirk, resigned.

Operating Officers.

W. O. Miller has been appointed Superintendent of the Canadian Pacific at Vancouver, B. C., succeeding J. C. Arundel, promoted.

R. H. Ingram, General Superintendent, Southern District, Southern Pacific, has been appointed General Manager of the Cananea, Yaqui River & Pacific and Assistant General Manager of the Sonora Railway, with office at Guaymas, Sonora, Mex.

Traffic Officers.

D. B. Daley has been appointed Freight Claim Agent of the Kansas City Southern.

William Shaw has been appointed General Agent of the Chicago, Burlington & Quincy at Indianapolis, Ind.

Charles E. Hooper has been appointed General Agent of the San Pedro, Los Angeles & Salt Lake at Denver, Colo.

C. H. Walter, Freight Solicitor of the Pere Marquette at Detroit, Mich., has been appointed Traveling Freight Agent at Toledo, Ohio.

George J. Allen has been appointed Commercial Agent of the Macon & Birmingham at Nashville, Tenn., succeeding J. F. Slowey, resigned.

Peter L. Markey, Agent of the Chicago, Milwaukee & St. Paul at Boone, Iowa, has been appointed Traveling Freight Agent at Milwaukee, Wis.

R. R. D. Hollowell, Commercial Agent of the Georgia Southern & Florida, at Nashville, Tenn., has been appointed Traveling Freight Agent of the Atlanta, Birmingham & Atlantic at Cincinnati, Ohio.

J. N. Steele, Traveling Freight Agent of the Trinity & Brazos Valley, has been appointed Traveling Freight and Passenger Agent of the Texas Midland, with office at 207 Main street, Houston, Tex.

H. P. Radley, whose resignation was announced in our issue of October 9, as General Freight and Passenger Agent of the Illinois Southern, retains his position as General Freight and Passenger Agent of the Southern Indiana.

L. L. Horning, City Ticket Agent of the Baltimore & Ohio Southwestern at St. Louis, Mo., has been appointed City Passenger Agent at St. Louis. B. N. Edmonson, Passenger Agent

at St. Louis, Mo., succeeds Mr. Horning. George Scheer, Assistant Ticket Agent at St. Louis, succeeds Mr. Edmonson.

C. A. Melin, District Passenger Agent and City Ticket Agent of the New York, Chicago & St. Louis at Erie, Pa., has been appointed District Passenger Agent at Denver, Colo., succeeding Charles E. Johnson, deceased. J. C. Melenbacker, Traveling Passenger Agent at Fort Wayne, Ind., succeeds Mr. Melin. F. P. Parnin succeeds Mr. Melenbacker.

C. C. Landers, Division Freight Agent of the Wabash at Detroit, Mich., has been appointed Division Freight and Passenger Agent at Danville, Ill., in charge of the territory from Lafayette, Ind., to Ivesdale, Ill., including the Champagne and Covington branches. E. H. B. Cull, Contracting Agent at Detroit, succeeds Mr. Landers, with office in the Majestic building, Detroit.

Engineering and Rolling Stock Officers.

John Mooney has been appointed Assistant Superintendent of Motive Power of the Grand Trunk Pacific, with office at Rivers, Man.

R. F. Kilpatrick has been appointed Assistant Superintendent of Motive Power of the Denver & Rio Grande, with office at Burnham, Colo.

P. F. Barton has been appointed Master Mechanic of the Morris & Essex division and of the Sussex Railroad branch of the Delaware, Lackawanna & Western, succeeding A. C. Adams, resigned, with office at Kingsland, N. J.

John G. Sullivan, the recently appointed Assistant Chief Engineer of the Eastern lines of the Canadian Pacific, was born in 1863 at Bushnell's Basin, Monroe county, N. Y. After graduating in 1888 from Cornell University with the degree of Civil Engineer, he began railroad work on the Great Northern as rodman. By 1890 he had become Assistant Engineer, and three years later was appointed Assistant Engineer of the Alberta Railway & Coal Co., now the Alberta Railway & Irrigation Co. In 1884 he was made Locating Engineer on the Butte, Anaconda & Pacific. The next year he was appointed Principal Assistant Engineer of the Kaslo & Slocam, now part of the Great Northern. In 1896 he became Reconnaissance Engineer on the Columbia & Western, now part of the Canadian Pacific, and two years later was made Principal Assistant Engineer. In 1900 he was appointed Division Engineer of Construction on the Canadian Pacific. In 1905 he became Assistant Chief Engineer on the Panama Canal, but two years later returned to the Canadian Pacific as Manager of Construction on the Eastern lines, which position he held until his recent appointment.

John G. Sullivan.

F. W. Thomas, Supervisor of Apprentices of the Atchison, Topeka & Santa Fe, has been appointed also Engineer of Tests, succeeding T. E. Layden, assigned to other duties. All matters pertaining to tests should be addressed to Mr. Thomas as Engineer of Tests, and all matters pertaining to apprentices should be addressed to him as Supervisor of Apprentices.

Francis Boardman, Division Engineer, Electric division, of the New York Central & Hudson River, has succeeded to the duties of C. E. Lindsay, Engineer of Maintenance of Way, Electric Zone, that office having been abolished and Mr. Lindsay having been transferred. Mr. Boardman's title remains Division Engineer and his headquarters have been moved from 125th street, New York, to the Grand Central Station.

OBITUARY.

Alfred Darlow, Advertising Manager of the Union Pacific until September 1, 1908, died at his home in Omaha, Neb., on October 19. He had been in the advertising department of this road for 20 years.

Bennett H. Brough, Secretary of the Iron & Steel Institute for 15 years, died at Newcastle-on-Tyne, England, on October 3. He was born in 1860, and after receiving a general education at the City of London school went to the Royal School of Mines, South Kensington, and the Prussian School of Mines, Clausthal, Germany. From this broad education, he became not only a thorough student in his own particular subjects, but acquired a knowledge of German and French, which was of the greatest assistance in his later career. In 1882 he was made assistant to Sir Warrington Smyth, of the Royal School of Mines, and in 1884 was appointed Co-Editor of the Journal of the Iron and Steel Institute. In 1893 he was elected Secretary and at the same time gave up his assistant instructorship in mine surveying which he had held at the Royal School of Mines since 1886. Beside his noteworthy work for the institute, he gave many lectures, among others three delivered under the Cantor fund of the Society of Arts—the first on Mine Surveying; the second on Nature and Yield of Metalliferous Deposits; and the last on the Mining of Non-metallic Metals. He was a juror at the Conventions Exhibition in 1885; at Paris in 1900; at the present Franco-British Exhibition, and was on certain committees of the St. Louis Exposition in 1904. He had considerable ability as an organizer, and the Iron and Steel Institute made great progress during his Secretaryship. He was a Knight of the Swedish Order of Wasa.

Railroad Construction.

New Incorporations, Surveys, Etc.

Alberta Central.—The Dominion government has granted a subsidy of $200,000 to this company, to build a line from Red Deer, Alb., west to the Rocky mountains, 70 miles. The office of the company is to be at Red Deer. It is said that construction work is to be started this fall.

Bonlee & Western.—Incorporated in Raleigh, N. C., with $150,000 capital stock, to build 14 miles of railroad in Chatham and Randolph counties to a point on the Deep river. The incorporators are: C. C. Burns, J. H. Dunlap, W. T. Brooks and C. M. Andrews, all of Raleigh.

Buffalo, Rochester & Pittsburgh.—An officer writes that in November, 1907, construction work was begun on a 10-mile strip of second track, also on grade and line revision between Ridgway, Pa., and Brockwayville, at an estimated cost of $790,000, work to include a 1,000-ft. double-track tunnel at Empire, Pa. The work is now nearing completion. The grading was done by Eyre-Shoemaker, Inc., Philadelphia, Pa., and the track-laying and bridge work by the company's forces. Track is now all in service with the exception of the tunnel. The excavation for the latter has been completed, and the masonry lining is under way. The contractors expect to turn the completed tunnel over to the company by the end of November. (May 22, p. 717.)

Canadian Northern Ontario.—It is expected that track laying on the line between Hawkesbury, Ont., and Ottawa, about 55 miles, will be completed and ready for traffic by next March.

Canadian Northern Quebec.—The new short line from Garneau Junction, Que., to Quebec, about 84 miles, will, it is announced, be officially opened on December 1. This line runs parallel to the St. Lawrence river for about 40 miles and crosses the Canadian Pacific at La Chevrotiere. The line passes through Cap Rouge, St. Augustin, Pointe aux Trembles and Cap Sante. (March 13, p. 395.)

Colorado & Southern.—Press reports from Denver, Col., say that surveys have been completed for the new line from Fort Collins, Col., north to Cheyenne, Wyo., about 40 miles, and also from Orin Junction, Col., the present northern terminus of the road, north to a connection with the Northern Pacific at Forsythe, Mont., about 260 miles. The report also

says that this company will double track its line from Pueblo, Col., south to Walsenburg, 56 miles.

DAKOTA & WESTERN.—An officer writes that this company has finished grading on its line from Rapid City, S. Dak., southwest to Hill City, 20 miles, but no track has yet been laid. The work is being done by the company's men. A. M. Lamphere, Chief Engineer, Rapid City. (Oct. 9, p. 1,120.)

FLAG RIVER.—Incorporated in Wisconsin to build from Superior, Wis., east via Portwing, Cornucopia and Herbster to Bayfield, 75 miles. B. C. Cook and James Bardon, of Superior, are interested.

GRAND TRUNK PACIFIC.—President C. M. Hays recently announced in Vancouver, B. C., that 120 miles of new work is now under construction west of Edmonton, Alb., and that early in November bids will be asked for an additional 200 miles west of Wolfe River, Alb., and for a further 100 miles east of the termination of the present 100-mile contract east from Prince Rupert, B. C. The arrangements for the construction of the line through British Columbia are not yet completed, but plans, etc., are being considered by the British Columbia provincial government. (Oct. 9, p. 1121.)

Track laying on the Lake Superior branch, Lake Superior Junction, Ont., southeast to Fort William, 210 miles, is being pushed, and is expected to be completed by Nov. 30. (R. R. G., March 13, p. 396.)

GREAT NORTHERN.—Press reports say that this company is making surveys for an extension of its Crookston-Noyes branch from the boundary at Emerson, Man., north to Winnipeg, about 65 miles.

GULF & SHIP ISLAND.—The work of improving the roadbed on the main line between Jackson, Miss., and Hattiesburg, has been resumed. Twenty carloads of new rails have been received. The entire main line and branches are to be relaid with heavier rails and the main line will be reballasted.

MARIANNA, AUBREY & WESTERN.—Incorporated in Arkansas to build and operate a line from Marianna, Ark., to Aubrey, in Lee county. The incorporators are: J. T. Robertson, W. B. Shipes, H. F. Roleson, H. N. Pharley, E. J. Beasley, R. C. Wilkins, Max D. Miller, J. R. Jarrett, P. R. Turner, W. S. Shackelford, and John Mixon.

MONTANA, WYOMING & SOUTHERN.—An incorporator writes that this company was recently granted a charter in Wyoming, with $5,000,000 capital, to build from Sheridan, Wyo., north to Miles City, Mont., 125 miles. An extension may eventually be built from the proposed southern terminus at Sheridan, south to the Colorado & Southern at Orin Junction, Wyo., 180 miles. R. H. Walsh, President of the First National Bank, Sheridan, is President.

NIANGUA & WESTERN.—Incorporated in Missouri with $600,000 capital stock, to build and operate a line from Bolivar, Polk county, Mo., east to Lebanon, Laclede county, about 60 miles. The incorporators include: A. C. Lovan, L. O. Lovan, Jennie S. Lovan, Georgia Lovan, and J. M. Smith, all of Springfield, Mo.

NORTHERN PACIFIC.—Press reports say that the plans of this company for enlargement of terminals in Minneapolis, Minn., call for an expenditure of $3,000,000 to be spent during the next two years, carrying out work already started. Passenger coach storage and cleaning yards are to be established, and the company will provide for the Burlington requirements in these respects. The yards are to cost $500,000. The company, it is said, has an option on property costing $1,500,000, including a right of way about 200 ft. wide to the yards, and plans the construction of additional tracks over this strip, part of which are to be elevated. The approximate cost of this work is $1,000,000.

NORTHWESTERN OKLAHOMA DEVELOPMENT CO.—See Winnipeg, Yankton & Gulf.

OKANOGAN ELECTRIC.—Rights of way, it is said, have been secured for a proposed line to be built from the junction of the Okanogan and Columbia rivers in the state of Washington, north to a connection with the Vancouver, Victoria & Eastern extension of the Great Northern in Okanogan county, 80 miles. The company was recently organized in Washington with $3,000,000 capital. A. M. Dewey is President and General Manager; G. D. Needy, Secretary, and M. L. Bevis, Treasurer.

OKLAHOMA, MEXICO & PACIFIC.—This company, incorporated last year in Oklahoma, with $500,000 capital and office at Oklahoma City, to build about 200 miles of road from Oklahoma City southwest in Oklahoma, recently amended its charter eliminating Greer and Kiowa counties from its proposed route. The line is to run from Oklahoma City to Kenton, in Cimarron county, 250 miles, passing through the counties of Oklahoma, Canadian, Caddo, Grady, Washita, Custer, Dewey, Ellis, Woodward, Beaver, Texas and Cimarron. The capitalization, $500,000, is not changed. (R. R. G., Nov. 8, 1907, p. 573.)

ONTARIO & SAN ANTONIO HEIGHTS (ELECTRIC).—Reports from Ontario, Cal., say that this company, which operates a 10-mile electric line, is making surveys for an extension from the present terminus at San Antonio Park, Cal., to Stoddard's Canyon, about two miles. Work on the extension will be begun at once.

OREGON MIDLAND.—Incorporated in Oregon with $100,000 capital to build from Weiser, Idaho, northwest to the Tillamook Bay country, via Portland, Ore. The incorporators are: John P. Van Arsdel, C. M. Coney, Miller Murdock and Robert Caples, all of Portland.

PRINCE EDWARD ISLAND RAILWAY.—Bids are asked up to noon, October 31, by D. Pottinger, General Manager, Moncton, N. B., for the construction of a branch line from Harmony, P. E. I., to Elmira Kings county, 10 miles. Plans are on file at the station agent's office at Souris, P. E. I.; with the resident engineer at Charlottestown; and at the office of the Chief Engineer at Moncton, N. B.

QUITMAN & GREAT NORTHERN.—The St. Louis Construction Co., which has the general contract, will sublet the grading and track laying work on the first 25 miles of this projected line in Wood county, Tex. Bids wanted also for the necessary wooden bridges, clearing, grubbing, etc., and for cross ties and timber. Proposals for the work should be addressed to the St. Louis Construction Co., 412 Commonwealth Trust building, St. Louis, Mo. The Quitman & Great Northern was organized to build from Mineola, Tex., north through Hopkins and Delta counties to Paris, in Lamar county, about 75 miles. (Aug. 28, p. 839.)

REGISTER & ROCKY FORD.—Application has been made for a charter to build a line from Register, Ga., which is 10 miles west of Statesboro, on the Dover and Dublin line of the Central of Georgia, north to Rocky Ford, on the same road, 25 miles. The company will have $125,000 capital stock and proposes to begin surveys at once. G. W. De Loach, M. A. Smith, P. M. Anderson and W. G. Warnell, of Tatnell county; J. W. Williams and F. P. Register, of Bulloch county, are interested.

ST. LOUIS & ST. LIBORY.—Incorporated in Illinois, with $100,000 capital, office at St. Libory, to build a line from the east bank of the Mississippi river opposite St. Louis, Mo., southeast in St. Clair county to St. Libory, about 40 miles. Incorporators and first board of directors are: E. L. Thomas, J. T. Taylor, C. A. Heinzelman, D. O. Thomas and G. A. Becker, all of Belvidere, Ill.

SALT LAKE & OGDEN.—An officer writes that contracts have been let for an extension of this road and that it is expected to have 100 miles completed within 18 months; also that the electrification of the line between Salt Lake City, Utah, and Ogden will be completed during the next six months.

SANOODY VALLEY RAILROAD.—J. P. Hornaday & Co., 30 Church street, New York, are asking bids, up to November 1, for building this proposed line from De Kalb, Miss., to the Mobile & Ohio, 12 miles. The work includes 86,000 cu. ft. of grading also standard oak ties and 60-lb. rails for the 12 miles. (Oct. 16, p. 1177.)

STEPHENVILLE, NORTH & SOUTH TEXAS.—Orders, it is said, were recently given for about 20 miles of rails for the extension of this road from Hamilton, Tex., south. The southern extension is projected 60 miles in the direction of San Antonio. (R. R. G., March 13, p. 395.)

TEXAS & PACIFIC.—Residents of Grand Falls, Tex., have given

this company right of way and a bonus for a branch south from the T. & P. main line to Grand Falls. It is planned to eventually extend the line south to Alpine, about 100 miles.

Texas Roads (Electric).—The cities of Waco, Tex., Temple, and Marlin have offered $100,000 cash, right-of-way and franchises through each city to W. D. Boyce and associates, of St. Louis, Mo., for an 80-mile interurban line. The proposition submitted by Mr. Boyce was that $200,000 in stock be subscribed for, but this was rejected and the above counter proposition offered by the residents of the three places.

Winnebago Traction Co.—See Wisconsin Electric.

Winnipeg, Yankton & Gulf.—Press reports from El Reno, Okla., say that this company, which was organized to build from Winnipeg, Man., south to the Gulf of Mexico, also from Buffalo, Okla., west to Des Moines, N. Mex., is negotiating to build for the Northwestern Oklahoma Development Co., recently organized at Okeene, Okla., a line from Fairview, Okla., on the Kansas City, Mexico & Orient, southeast via Okeene, Kiel and Kingfisher, to Oklahoma City, about 90 miles. H. L. Miller, Great Bend, Kan., is President of the Winnipeg, Yankton & Gulf. (July 10, p. 505.)

Wisconsin & Northern.—An officer is quoted as saying that the extension from Neopit, Wis., to the western limit of the Menominee Indian reservation, near Phlox, will be ready for operation by the end of the year. This extension is being built under an agreement between this road and the Department of the Interior, which gi s the road a right to cross the Government reservation l The McDonnell-O'Connor Co., Shawano, Wis., is the cont (Oct. 2, p. 1076.)

Wisconsin Electric.—The ebago Traction Co., operating 40 miles of electric line n Wisconsin, is now owned by the incorporators of the Wisconsin Electric, organized about two months ago in Wisconsin. The officers of the Wisconsin Electric are: Clement C. Smith, President, Milwaukee; J. B. Blake, Secretary, Oshkosh; R. T. Dunn, General Manager, Fond du Lac; J. P. Pullian, General Superintendent, and W. J. Kelsh, Master Mechanic, both of Oshkosh. President Smith is quoted as saying that plans are now being made for building an extension from Omro, Wis., the present western terminus of the interurban system, southwest to Berlin, 13 miles.

Railroad Financial News.

Central Park, North & East River.—See New York City Railway.

Chicago Terminal Transfer.—G. W. Kellogg and W. G. Adams have been elected directors, succeeding A. C. Emery and McClay Hoyne. J. L. Nichols and W. E. Faithorn have also been elected directors.

Chesapeake & Ohio.—George S. Bowdoin has been elected a Director, succeeding H. McK. Twombly. The other directors were re-elected. It is said that the question of financing was not discussed at the annual meeting.

Colorado & Southern.—Shoemaker, Bates & Co., New York, are offering $250,000 Colorado & Southern first mortgage bonds of 1929. This is part of a $20,000,000 authorized issue of bonds at the rate of about $19,000 per mile, all of which bonds are outstanding.

Erie.—J. P. Morgan & Co., New York, in accordance with the plan of June 11, 1908, will buy on or before October 31 tne coupons due November 1 on the $2,482,000 New York & Erie first mortgage 4 per cent. bonds, and the coupons from the $1,100,000 New York, Lake Erie & Western Coal & Railroad first mortgage 6 per cent. bonds.

Kansas City Belt Line.—H. L. Harmon, President of the Kansas City Terminal Railway, has been elected also President and a Director of the Kansas City Belt Railway.

Kansas City, Mexico & Orient.—Foster & Braithwaite, London, England, are offering at par £200,000 ($1,000,000) secured 6 per cent. five year convertible notes due 1913. Holders of these notes have the option of exchanging them for 4 per cent. first mortgage 50 year bonds of 1901-1951, the bonds to be taken at 80, that is, £160 ($800) in notes to each $1,000 bond.

Kansas City Terminal.—See Kansas City Belt Line.

Metropolitan Street Railway.—See New York City Railway.

Milwaukee Electric Railway & Light.—Spencer Trask & Co. and N. W. Harris & Co., New York, are offering $1,000,000 refunding and extension 4½ per cent. bonds of 1906-1931, at 95. This is part of an authorized issue of $20,000,000, of which $8,000,000 are reserved and the rest are to be issued at the rate of not more than $1,000,000 a year. There are now outstanding $4,608,000.

New York City Railway.—Judge Lacombe in the United States Circuit Court has handed down a decision holding that the receivers of the New York City Railway and the Metropolitan Street Railway are not obliged to turn over to the Central Park, North & East River 40 electric cars, 100 horse cars, and 700 horses received under the terms of the lease of October 14, 1892. In the case of the Second Avenue, Judge Lacombe ordered the receivers of the Metropolitan to turn over to the Second Avenue 75 cars which the Metropolitan received under its lease. The electric cars used on the Fifty-ninth street cross-town line were bought, it is held, for use on the entire Metropolitan system and do not, therefore, need to be turned over to the Central Park, North & East River company.

Philadelphia, Bristol & Trenton (Electric).—This company, which is a subsidiary of the Interstate Railways, defaulted the interest due September 1 on its bonds. Receivers have been twice appointed and twice discharged in the past three weeks, it having been discovered that the company, under its charter, cannot be thrown into the hands of receivers until six months after the default of interest. The road, which runs from Torresdale, Pa., to Morrisville, 21 miles, is now being operated by its officers.

Philadelphia Rapid Transit Co.—A special meeting of stockholders of the Union Traction Co. has been called for Oct. 29 to take action on the request of the Philadelphia Rapid Transit Co. to transfer certain securities which it acquired from the Union Traction Co. under the lease of July 1, 1902, for the purpose of securing a collateral trust loan of $5,000,000. The Union Traction Co. is to be secured by an interest in the Market Street Elevated Passenger Railway. Money received from the sale of collateral trust notes is to be used by the Rapid Transit Company to make payments for work already undertaken, for extensions and improvements, and to meet the dividend on Union Traction stock until better times makes it possible to operate that road without a deficit.

Puget Sound International Railway & Power Co.—The property of the Seattle-Everett Interurban, a line in operation from Ballard, Wash., to Halls Lake, 17 miles, has been taken over by the Puget Sound International Railway & Power Co.

St. Joseph & Grand Island.—E. H. Harriman has been elected a director, succeeding W. T. Van Brunt.

Seattle-Everett Interurban.—See Puget Sound International Railway & Power Co.

Second Avenue (New York).—See New York City Railway.

Union Pacific.—Stockholders have approved the extension of the first lien and refunding mortgage so as to cover the company's entire mileage, making it a first lien on 1,178 miles of main track and 147 miles of other track, and a lien subject to the first and land grant mortgage on the remaining 2,090 miles of first track and 1,366 miles of other track. (September 4, p. 890.)

Virginian Railway.—H. H. Rogers has been elected President, succeeding W. N. Page.

Washington, Baltimore & Annapolis (Electric).—Stockholders have authorized the directors to increase the capital stock from $5,250,000 to $6,000,000.

Wichita Falls & Southern.—The Texas Railroad Commission has been asked to make a valuation of property preliminary to issuing bonds on 55 miles of road in operation between Wichita Falls and Newcastle.

ANNUAL REPORT

NINTH ANNUAL REPORT OF THE COLORADO & SOUTHERN RAILWAY COMPANY FOR THE FISCAL YEAR ENDED JUNE 30, 1908.

NEW YORK, October 1, 1908.

To the Stockholders:

The Board of Directors herewith submit their report for the fiscal year ended June 30, 1908.

This report combines for convenience the operations and affairs of lines operated by the companies named, which are herein designated "Colorado & Southern Lines":

The Colorado & Southern Railway Company	1,249.64	miles
The Colorado Springs & Cripple Creek District Railway Company, operating separately in Colorado	74.30	"
Fort Worth & Denver City Railway Company, operating separately in Texas	454.14	"
Wichita Valley Lines, operating separately in Texas	174.40	"
Total operated mileage June 30, 1908	1,952.48	

This is an increase of 94.81 miles over the operated mileage June 30, 1907, accounted for as follows:

Operation of freight trains over Union Pacific Railroad between Denver and Cheyenne under trackage arrangement	106.92	miles
Revision of Colorado & Southern Railway mileage by remeasurement under direction of Chief Engineer	2.94	"
New construction of the Colorado Railroad (all operated by the Colorado & Southern Railway Company)	1.17	"
	111.03	
Less:		
Pels branch, Colorado & Southern Railway	15.75	
Economic spur, Colorado Springs & Cripple Creek District Railway	.47	
(These pieces of track, being of no further service, were taken up in order to save further deterioration of salvage.)	16.22	
Increase in operated mileage for the year	94.81	

The running of freight trains between Denver and Cheyenne under trackage agreement with Union Pacific Railroad Company was inaugurated September 1, 1907, so as to handle in your own trains business to and from your Wyoming division, which extends north from Cheyenne, a distance of 153.68 miles. While the number of freight trains run by your company under this arrangement averaged only one and one-half per day, the addition of this 106.92 miles to the schedule of your operated mileage is in conformity with the accounting rules of the Interstate Commerce Commission. The Wichita Valley Lines, as stated in the last annual report, were included in operations from January 1, 1907, so that for the six months July 1, 1907, to December 31, 1907, there was an increase in mileage as compared with the same months in 1906. The result of all these changes was an increase in average miles operated for the year of 173.70, and because the additional lines herein referred to had less traffic than other "Colorado & Southern Lines," the aggregate operating revenues, operating expenses and net operating revenues per mile of road were somewhat diminished. Of the $906,731.19 increase in aggregate operating revenues for the year, $453,399.01 is attributable to additional mileage as herein described.

The term "Colorado & Southern Lines" indicates the lines owned and operated by the Colorado & Southern Railway Company, together with the lines whose capital stock is owned wholly, or nearly so, by that company, and is used in distinction from lines in which the Colorado & Southern Railway Company is interested, as follows:

The Colorado Midland Railway Company, which operated separately in Colorado, on June 30, 1908, and in which your company has beneficial interest in one-half of the capital stock.	337.64	miles
The Trinity & Brazos Valley Railway Company, which operated separately in Texas, on June 30, 1908. All of the issued stocks and bonds of which are pledged under the Colorado & Southern refunding and extension mortgage, but in whose stock the Rock Island Company has taken a one-half interest, subject to the liens of the Colorado & Southern mortgages.	421.72	"

Results for the Year.

Operating revenues were (Increase, $906,731.19, or 6.78 per cent.)		$14,280,535.24
Operating expenses were (Increase, $612,581.62, or 6.82 per cent.)		9,594,205.81
Net operating revenues were (Increase, $294,149.57, or 6.70 per cent.)		$4,686,329.43
Taxes were (Increase, $71,905.71, or 21.45 per cent.)		407,101.44
Operating income, taxes deducted, was		$4,279,227.99
Miscellaneous income, less hire of equipment, was		355,733.58
Income for the year, available for interest, was (Increase, $649,504.67, or 16.30 per cent.)		$4,634,961.57
Interest on bonds amounted to	$2,232,932.00	
Payment by Fort Worth & Denver City Railway Company under "Stamped" stock agreement of October 12, 1895	6,198.62	
Interest on equipment bonds and on deferred equipment rental payments	135,022.52	
Interest on other obligations	88,905.11	
		2,463,058.25
Leaving net income for the year (Increase, $80,045.57, or 3.83 per cent.)		$2,171,903.32

Dividends paid during year:		
On $8,500,000 1st preferred stock, 4 per cent.	$340,000	
On $8,500,000 2d preferred stock, 4 per cent.	340,000	
		$680,000.00

Traffic.

The increase in operating revenues above mentioned is accounted for as follows:

In freight traffic (Increase, 3.63 per cent.)	$350,341.93
In passenger traffic (Increase, 12.81 per cent.)	403,089.36
In express, mail and miscellaneous (Increase, 27.07 per cent.)	153,299.90
Total increase (6.78 per cent.)	$906,731.19

Expenses.

The increase in operating expenses is accounted for as follows:

In maintenance of equipment (Increase, 15.84 per cent.)	$290,486.95
In traffic expenses (Increase, 8.55 per cent.)	21,808.48
In transportation expenses (Increase, 11.33 per cent.)	474,070.39
In general expenses (Increase, 24.29 per cent.)	96,582.14
	$882,947.96
Less decrease:	
In maintenance of way and structures (Decrease, 11.69 per cent., nearly all in rail renewals, for which the necessities of the year were very small on account of work done in previous years.)	270,366.34
Total increase (6.82 per cent.)	$612,581.62

The percentage of operating revenues required for operating expenses was 67.18 per cent., as compared with 67.16 per cent. in the previous year, and the proportion of income required for interest was 53.12 per cent., as compared with 47.51 per cent. in the previous year.

Bond Issues.

During the year refunding and extension mortgage bonds of your company were issued for the following purposes:

The Colorado Railroad Company securities	$326,148.25
The Denver & Interurban Railroad Company securities	865,445.94
The Gilpin Railroad Company securities	33,241.38
The Colorado Springs & Cripple Creek District Railway Company bonds retired	150,000.00
Fort Worth & Denver City Railway Company securities	484,352.85
Wichita Falls & Oklahoma Railway Company securities	30,222.32
Wichita Valley Railroad Company securities	136,485.89
Abilene & Northern Railway Company securities	153,958.15
The Trinity & Brazos Valley Railway Company securities	1,418,808.12
General corporate purposes	933,511.25
Betterments and improvements for the calendar year 1908	1,056,025.00
	$5,588,199.15

and refunding and extension mortgage bonds to the face amount of $1,256,162.26 were sold, including $644,173.22 delivered to the Chicago, Rock Island & Pacific Railway Company in reimbursement for advances by that company to your company for construction expenditures upon the Trinity & Brazos Valley Railway from June 1, 1907, to December 31, 1907, in respect of which the Trinity & Brazos Valley Railway Company has issued its first mortgage bonds which have been pledged under the refunding and extension mortgage of your company, such delivery being in accordance with an arrangement between your company and the Chicago, Rock Island & Pacific Railway Company made in June, 1907.

During the year, on application of Fort Worth & Denver Terminal Railway Company, a revaluation of its property was made by the Texas Railroad Commission upon the basis of which the issue by that company of $15,000 stock and $728,000 first mortgage bonds was authorized by the commission in lieu of $200,000 stock and $200,000 first mortgage bonds previously issued, which were canceled. Of the new bonds so issued, $300,000 were purchased by your company and resold, the proceeds being invested in the purchase of the remaining outstanding shares of unstamped stock of Fort Worth & Denver City Railway Company. The remainder of these bonds, $428,000, was received by Fort Worth & Denver City Railway Company in satisfaction of cash advances and for property transferred to the Terminal Company, including the securities canceled as above, and are held as a free asset in the treasury of Fort Worth & Denver City Railway Company.

On June 30, 1908, the total bond issues of the Colorado & Southern Railway Company were as follows:

First mortgage bonds	$19,402,000.00
Refunding and extension mortgage bonds	25,110,116.05
On the same date your assets included the following:	
First mortgage bonds owned by your company	$,300,000.00
Refunding and extension mortgage bonds owned by your company	5,346,570.70
Fort Worth & Denver Terminal Railway Company first mortgage bonds owned by Fort Worth & Denver City Railway Company	428,000.00
	$6.074.570.70

and your company also held:

Refunding and extension mortgage bonds, to be appropriated for improvements and betterments	$864,628.68

Since June 30, 1908, sales of bonds have been made as follows:

First mortgage bonds	$300,000.00
Refunding and extension mortgage bonds	3,000,000.00

All first mortgage bonds which your company is at liberty to sell have now been issued.

The Trinity & Brazos Valley Railway.

Full explanations concerning the construction and ownership of this line were made in the last two annual reports. The construction work in progress at the time of the last report has been prosecuted diligently, but on account of unusual rains progress was much slower than was hoped for a year ago. In consequence, it has been practicable to accept only a small part of the business available for this line and the expenses of operation have been more than the revenue. At this writing, however, the line from Dallas to Galveston is ready for a large business and the outlook for traffic from now on is most promising, particularly on account of excellent crop conditions in Texas and Oklahoma. Because of the circumstances above noted, considerable sums have been advanced to cover the deficit in operations and for construction and improvement work for which bonds have not been issued by the Trinity & Brazos Valley Railway Company, and these sums, together with unpaid interest, stand, on June 30, 1908, as a charge to the Trinity & Brazos Valley Railway Company. The amounts so charged will be found stated in the following tables. Since Jan. 1, 1908, the Chicago, Rock Island & Pacific Railway Company has, under the agreement mentioned in the last two annual reports, participated with your company in making advances from time to time to meet requirements of the Trinity & Brazos Valley Railway Company. For all the foregoing advances, the Trinity & Brazos Valley Railway Company certificates of indebtedness are, under the agreement, issuable in favor of the companies respectively making such advances.

Extensive and superior freight terminals at Galveston, acquired and constructed by Galveston Terminal Railway Company, for which advances have been made equally by your company and by the Chicago, Rock Island & Pacific Railway Company, are now in satisfactory operation. The new freight terminals of the Houston Belt & Terminal Railway Company, also excellent in location and character of construction, for which advances have been made by your company, the Rock Island Lines, the Santa Fe, the Frisco Lines and the St. Louis, Brownsville & Mexico Railway Company, will be in operation soon after the appearance of this report. On account of financial conditions, the construction of new passenger terminals of the Houston Belt & Terminal Railway Company has been deferred and the passenger station of the Santa Fe at that point is still being used. Your company and the Chicago, Rock Island & Pacific Railway Company have jointly vested in the Trinity & Brazos Valley Railway Company one-fourth of the capital stock of Houston Belt & Terminal Railway Company, and purpose, in the near future, to adopt a similar course with reference to practically the entire outstanding capital stock of Galveston Terminal Railway Company. By this means the extensive and valuable terminals controlled through these terminal companies will, to the extent described herein, become assets of the Trinity & Brazos Valley Railway Company, and will further augment the value to your company of its investment in that line.

The Denver & Interurban Railroad.

This electric line, mentioned in last annual report, has been completed and its results are being included in statements of the operations of "Colorado & Southern Lines" since July 1, 1908. This adds 27.05 miles to the operated mileage of "Colorado & Southern Lines" and, besides this, electric cars are operated over 24.27 miles of Colorado & Southern tracks already included in operated mileage.

Improvement Work.

Notwithstanding the disagreeable financial conditions which arose so unexpectedly during the last year, nearly all of the improvement and construction work which was in progress has been continued. Up to June 30, 1908, 28.52 miles of rock ballast and 110.15 miles of gravel ballast, a total of 138.67 miles, had been completed on your Fort Worth and Denver line. A few years ago a well maintained dirt road was sufficient for the business of that line, but in ten years its freight ton miles have increased 179 per cent. and passenger train milage has increased 174 per cent. With continually increasing costs during that period for wages, ties and other items, your officials discovered, as officials of other lines have done, that almost the only offset which could be devised was the hauling of much larger trains, and this involved the purchase of heavier locomotives. During the last year there was a great deal of rain, which, together with the heavier trains, has made it impossible to maintain the unballasted track in satisfactory condition at all times. However, the ballasting is being continued with diligence, and it is expected that the whole line, which is in first class condition otherwise, will be well ballasted by June 30, 1910, and by December 31, 1910, the programme adopted several years ago under which permanent bridges are being substituted for wooden bridges, will be completed, thus eliminating every wooden bridge on that line (68 per cent. having already been eliminated) except over the Canadian, the Red and the Pease rivers. Up to June 30, 1908, $94,994.32 had been advanced to the Alvord Railroad, a piece of road, about nine miles in length, which it was necessary to construct in order to reach the only satisfactory stone quarry to be found adjacent to your Fort Worth & Denver line. The amount charged to ballasting and bank widening on that line for the year was $324,229.42. Besides this, there was $25,011.02 charged to ballasting and bank widening on the Fort Collins district in northern Colorado. There will be a similar amount expended on that district during the current year. The other large item in improvement work for the last year is $254,490.02 for the building of a new line 7.41 miles in length between Louisville Junction and Semper, Colo., just north of Denver. This line has a maximum grade of eight-tenths of 1 per cent. and is used for freight and passenger traffic moved by steam, while the old line alongside, which has a maximum grade of 1.36 per cent., is used for the electric operations of the Denver & Interurban Company.

Bills Payable.

On account of the prosecution of improvement and construction work mentioned in the preceding sections of this report, your company had created prior to June 30, 1908, bills payable to the amount of $2,500,000, which have been paid off since that date. Your company now has no floating debt.

New Equipment.

The changes in new equipment account during the year were not large, but are fully set forth in a following table.

Besides the items enumerated therein, and in anticipation of a large traffic this fall and winter, thirteen locomotives were purchased for your Fort Worth & Denver line, which have been delivered by the builders since the close of the year.

Surplus Account.

The surplus on "Colorado & Southern Lines" for three years ended June 30, 1908, amounted to	$6,029,973.10
During this period, dividends were paid as follows:	
On Colorado & Southern first preferred stock	$850,000.00
On Colorado & Southern second preferred stock	510,000.00
	$1,360,000.00
The surplus on "Colorado & Southern Lines" to June 30, 1908, amounted to	$10,567,515.67
Out of which $1,393,663.97 was written off for discount on bonds sold, improvements, betterments, uncollectible accounts, etc., and dividends have been paid by the Colorado & Southern Railway Company, as follows:	
On Colorado & Southern first preferred stock	$2,125,000.00
On Colorado & Southern second preferred stock	510,000.00
	$2,635,000.00

In each case the profit not distributed to shareholders was devoted to improving the physical and other assets of your company and its auxiliary lines, and the public has, of course, been furnished with more and more facilities from year to year.

It is the desire of your company to keep abreast of all reasonable demands for service, not only at competitive points, but also in purely local territory; hence, the large amounts expended out of income as above indicated.

Statements, both financial and statistical, presented by the General Auditor, exhibit, fully, operations for the year, and the accounts have been verified by Messrs. Deloitte, Plender, Griffiths & Co., whose certificate appears below.

Acknowledgment is made with pleasure to officers and employees for faithful service rendered.

By order of the Board of Directors:

Grenville M. Dodge, Chairman. Frank Trumbull, President.

Deloitte, Plender, Griffiths & Co.,
49 Wall street, New York, September 24, 1908.

Grenville M. Dodge, Esq., Chairman of the Board of Directors of the Colorado & Southern Railway Company, New York City.

Dear Sir: We have made an examination of the books and accounts of

The Colorado & Southern Railway Company,
Fort Worth & Denver City Railway Company,
The Colorado Springs & Cripple Creek District Railway Company,
The Wichita Valley Railway Company,
Wichita Falls & Oklahoma Railway Company,
Wichita Valley Railroad Company,
Abilene & Northern Railway Company,
The Colorado Railroad Company, and
Fort Worth & Denver Terminal Railway Company,

comprising the "Colorado & Southern Lines," for the year ended June 30, 1908.

The securities owned and on hand have been produced to us and certificates obtained relative to those in the hands of trustees, pledged or assigned as collateral. The cash items have also been duly verified.

We have examined the charges to "Improvement Account" during the period, all of which, in our opinion, are proper.

We have particularly investigated the charges for repairs and renewals of equipment and found that all equipment destroyed or sold during the period has been replaced or provided for by charges to operating expenses.

And we certify that the attached balance sheet and accompanying statement of income and profit and loss accounts correctly set forth the financial position as shown by the books of the various companies as at June 30, 1908, and the result of operating the lines for the year ended that date. Yours truly, Deloitte, Plender, Griffiths & Co.

Revenues and Expenses for the Fiscal Year Ended June 30, 1908, Compared with June 30, 1907.

		Per cent. of operating revenues. This year.	Last year.	Increase.
Operating Revenues:				
Freight	$10,011,748.85	70.11	72.24	$350,341.93
Passenger	3,549,196.48	24.85	23.53	403,089.36
Express, mail and miscel.	719,589.91	5.04	4.23	153,299.90
Total operating revenues.	$14,280,535.24	100.00	100.00	$906,731.19
Operating Expenses:				
Maint. of way and struct.	$2,041,563.41	14.30	17.29	*$270,366.34
Maintenance of equipment.	2,124,147.98	14.87	13.71	290,486.95
Traffic expenses	276,794.60	1.94	1.91	21,808.48
Transportation expenses	4,657,527.55	32.61	31.28	474,070.39
General expenses	494,172.27	3.46	2.97	96,582.14
Total operating expenses.	$9,594,205.81	67.18	67.16	$612,581.62
Net operating revenues	$4,686,329.43	32.82	32.84	$294,149.57
Taxes	407,101.44	2.85	2.51	71,905.71
Operating income	$4,279,227.99	29.97	30.33	$222,243.86
Average miles operated	1,931.71			173.70

* Decrease.

NOTE.—For the purpose of comparison, last year's figures have been revised to conform to the Interstate Commerce Commission classifications, effective July 1, 1907

Statement of Income Account for the Fiscal Year Ended June 30, 1908.

Operating revenues		$14,280,535.24	
Operating expenses		9,594,205.81	
Net operating revenues		$4,686,329.43	
Taxes		407,101.44	
Operating income		$4,279,227.99	
Add:			
Income from investments	$496,388.52		
Interest, discount and exchange	70,400.00		
Insurance commissions	2,788.17		
Outside operations	5,465.73		
Rentals	5,053.58		
	$580,096.00		
Less hire of equipment	224,362.42		
		355,733.58	
Balance available for interest			$4,634,961.57
Less:			
Interest on 1st mort. 4 per cent. bonds, C. & S. Ry. Co.	$764,080.00		
Int. on refund. & ext. mort. 4½ per cent. bonds, C.& S.Ry.Co.	810,480.89		
Int. on 1st mort. 5 per cent. bonds, C. S. and C.C.D.Ry.Co.	87,690.27		
Int. on 2d mort. 5 per cent. bonds C. S. and C.C.D.Ry.Co.	9,970.84		
Int. on 1st consol. mort. 5 per cent. bonds, C. S. and C. C. D. Ry. Co.	68,950.00		
Int. on 1st mort. 6 per cent. bonds, F. W. & D. C. Ry. Co.	490,260.00		
Int. on 1st mort. 6 per cent. bonds, F. W. & D. T. Ry. Co.	1,500.00		
Payment by F. W. & D. C. Ry. Co. under "Stamped Stock" agreement of Oct. 12, 1895.	6,198.62		
Fiscal year's proportion of interest on equipment bonds	48,750.00		
Fiscal year's proportion of interest on deferred rentals under equipment leases	86,272.52		
Interest on other obligations	88,905.11		
			2,463,058.25
Net credit to income for the fiscal year ended June 30, 1908			$2,171,903.32
Balance to credit of profit and loss, June 30, 1907		$4,699,267.62	
Add:			
Profit on material sold	$17,197.57		
Credit account revaluation Fort Worth terminals by Texas Railroad Commission as basis for recapitalization	321,766.17		
Miscellaneous items	15,158.33		
		354,122.07	
			$5,053,389.69
Dividends Paid on:			
1st prefd. stock C. & S. Ry. Co., div. No. 12, Oct. 1, 1907.	$170,000.00		
1st prefd. stock C. & S. Ry. Co., div. No. 13, April 1, 1908.	170,000.00		
2d prefd. stock C. & S. Ry. Co., div. No. 2, Oct. 1, 1907	170,000.00		
2d prefd. stock C. & S. Ry. Co., div. No. 3, April 1, 1908	170,000.00		
Uncollectible accounts, etc.	6,441.31		
		686,441.31	
			4,366,948.38
Surplus carried to profit and loss			$6,538,851.70

Balance Sheet, June 30, 1908.

Assets.

Cost of road and equipment, including discount on securities not written off			$84,425,073.65
Improvements			3,000,902.40
New equipment			9,192,559.95
Current Assets:			
Cash	$509,039.75		
Cash with trustees to pay coupons and dividends	120,870.74		
Construction advances Galveston Terminal Ry. Co.	*395,590.79		
Individuals and companies	612,203.38		
Agents and conductors	269,069.17		
United States government	55,777.84		
Foreign roads traffic balances.	141,041.12		
Insurance paid in advance	23,696.47		
State and county warrants	17,037.51		
		$2,144,326.77	
Material and supplies		1,090,682.42	
1st mort. bonds of C. & S. Ry. Co. in treasury, par value		300,000.00	
Refund. and ext'n mort. bonds of C. & S. Ry. Co. in treasury (includ. $258,728.24 in hands of trustee, delivered to treasurer July 3, 1908), par value		5,346,570.70	
1st mort. bonds of F. W. & D. Ter. Ry. Co. in treasury, par value		428,000.00	
Deferred Assets:			
Accr'd int. on securities owned		255,029.49	
			9,564,609.38
Construction Advances:			
Acct. Walsenburg & W'n Ry.		$19,908.23	
" Alvord R. R.		94,994.32	
" Dallas Terminals		169,626.07	
" Trinity & Brazos V. Ry.		380,000.00	
" Houston Belt & Ter. Ry.		229,249.48	
			893,778.10
Special Funds:			
Cash in hands of treasurer received in payment of property held under 1st mort. C. & S. Ry. Co.		$48,547.48	
Cash in hands of trustee applicable to redemption of Colo. Springs & Cripple Crk. Dist. Ry. Co.'s 1st mor. bonds		246.93	
			48,794.41
Other Assets:			
Securities of other companies.		11,732,190.35	
Refund. and extension mort. bonds held to be appropriated for imprmts. & btmnts.		864,628.68	
			12,596,819.03
			$119,722,536.92

* Galveston Terminal Ry. Co. holds in its treasury $1,106,000 of its first mortgage gold bonds, out of the proceeds of which liabilities for construction and acquisition of property will be discharged.

Liabilities.

Capital stock:			
1st prefd., C. & S. Ry. Co.		$8,500,000.00	
2d prefd., C. & S. Ry. Co.		8,500,000.00	
Common, C. & S. Ry. Co.	$31,000,000.00		
Common, Colo. Spgs. & Cripple Creek District Ry. Co	900.00		
The Colorado Railroad Co.	500.00		
F. W. & D. City Ry. Co., incl. $85,772 "Stamped"	88,822.00		
The Wichita Valley Ry. Co.	900.00		
Wichita Falls & Oklahoma Ry. Co.	900.00		
Wichita Valley R. R. Co.	900.00		
Abilene & Northern Ry. Co.	900.00		
F. W. & D. Ter. Ry. Co.	900.00		
		31,094,722.00	
			$48,094,722.00
Funded debt:			
1st mort. 4 per cent. bonds, C. & S. Ry. Co.		$19,402,000.00	
Refund. & extension 4½ per cent. bonds, C. & S. Ry. Co.		25,110,116.05	
1st mort. 5 per cent. bonds, Colo. Springs & Cripple Creek Dist. Ry. Co.		1,740,000.00	
2d mort. 5 per cent. bonds, Colo. Springs & Cripple Creek Dist. Ry. Co.		194,000.00	
1st consol. mort. 5 per cent. bonds, Colo. Spgs. & Cripple Creek Dist. Ry. Co.		1,379,000.00	
1st mort. 6 per cent. bonds, F. W. & D. City Ry. Co.		8,171,000.00	
1st mort. 6 per cent. bonds, F. W. & D. Ter. Ry. Co.		728,000.00	
			56,724,116.05
Equipm't bonds, Series "A," C. & S. Ry. Co.		924,000.00	
Equipm't lease, "Pullman," C. & S. Ry. Co. deferred rentals		251,489.10	
Equipm't lease, Series "A," F. W. & D. C. Ry. Co. deferred rentals		468,000.00	
Equipm't lease, Series "B," F. W. & D. C. Ry. Co., deferred rentals		340,000.00	
Equipm't lease, "Pullman," F. W. & D. C. Ry. Co., deferred rentals		840,405.00	
			2,823,894.10
Current Liabilities:			
Vouchers	$706,662.58		
Payrolls	522,889.28		
Foreign roads—traffic bal.	357,448.45		
Int. on bonds due and unpaid	93,366.93		
Unclaimed dividends	8,207.50		
Employees' deposits	1,944.00		
Insurance collected	4,853.43		
Rail released not relaid	35,563.25		
Equipm't renewal reserve	252,247.67		

Building renewal reserve..	75,385.89	
		$2,058,568.98
Bills payable		2,500,000.00
Deferred Liabilities:		
Accrued taxes	$284,642.13	
Accrued interest not yet due	580,159.55	
Accrued for renewal of rails	36,826.49	
Accrued for renewal of bridges	3,796.41	
Accrued for renewal of equipment	76,959.51	
		982,384.09
		5,540,953.07
Balance to credit of profit and loss		6,538,851.70
		$119,722,536.92

Statement of Securities Pledged or Assigned.

	Under 1st mortgage C. & S. Ry. Co. Par value.	Under refund. and extens'n mort. C. & S. Ry. Co. Par value.
Colo. & South. Ry. Co. equip. trust notes	.....	$1,442,976.86
Denver & Inter. R. R. Co. capital stock.	.....	800.00
Denver & Inter. R.R. Co. 1st mor. bonds	.....	903,000.00
Colorado R. R. Co. capital stock	.....	99,900.00
Colorado R. R. Co. 1st mort. bonds	.....	348,000.00
Colorado Springs & Cripple Creek Dist. Ry. Co. preferred stock	.....	800,000.00
Colorado Springs & Cripple Creek Dist. Ry. Co. common stock	.....	1,199,100.00
Colorado Midland Ry. Co. prefer'd stock (beneficial interest in ½ of $4,954,800 par value)	$2,477,400.00	.....
Colorado Midland Ry. Co. common stock (beneficial interest in ½ of $3,420,200 par value)	1,710,100.00	.....
F. W. & Den. City Ry. Co. capital stock	6,390,983.00	340,975.00
Fort Worth & Denver City Ry. Co. capital stock "Stamped"	1,560.00	2,411,624.00
F. W. & D. C. Ry. Co. 1st mort. bonds..	5,000.00	.....
F. W. & D. C. Ry. Co. equip. trust notes	.....	159,017.28
Wichita Valley Ry. Co. capital stock.	.....	1,019,100.00
Wichita Valley Ry. Co. 1st mort. bonds.	.....	769,000.00
Wichita F. & Okla. Ry. Co capital stock	.....	22,100.00
Wich. F. & Okla. Ry. Co. 1st mort. bonds	.....	257,000.00
Wichita Valley R. R. Co. capital stock..	.....	60,100.00
Wichita Valley R.R. Co. 1st mort. bonds	.....	744,000.00
Abilene & Northern Ry. Co. capital stock	.....	39,170.00
Abilene & North. Ry. Co. 1st mort. bonds	.....	516,000.00
Trinity & Braz. Val. Ry. Co. capital stock	.....	303,100.00
Trinity & Brazos Valley Ry. Co. 1st mortgage bonds	.....	8,760,000.00
Gilpin R. R. Co. capital stock	.....	199,950.00
Union Depot & Ry. Co., Denver, capital stock	80,000.00	.....
Pueblo Union Depot & R. R. Co. capital stock and sinking fund	22,520.00	.....
Miscellaneous securities	.....	518,500.00
Total	$10,687,563.00	$20,913,343.14

All securities subject primarily to either mortgage are also subject secondarily to the other mortgage.

Colorado & Southern refunding and extension bonds of the par value of $4,169,000, as shown on balance sheet, pledged to secure bills payable, as shown on balance sheet.

Analysis of New Equipment Accounts for the Fiscal Year Ended June 30, 1908.

Description.	Amount.	Total.
New Equipment:		
Balance to new equip. accounts July 1, 1907.		$8,900,671.40
Additions during the year—		
2 locomotive tenders, W. V. Ry. Nos. 6 & 7.	$3,058.58	
Advance paym't 1908 equip., F.W.& D.C.Ry.	650.00	
	$3,708.58	
Trust Equipment:		
Under date of Feb. 11, 1907, a lease was entered into by the C. & S. Ry. Co. for the procuring of certain equipment from the Pullman Co., as follows:		
300 standard gage box cars, C. & S. Nos. 13200 to 13499, inclusive.		
2 standard gage passenger and mail cars, C. & S. Nos. 330 and 331		
Cash paid on same.	42,669.90	
Lease warrants payable in semi-annual instalments of $15,112.35, due Nov. 1, 1907, and $15,112.25 due May 1 and Nov. 1 each year thereafter to May 1, 1915.	241,796.10	
Interest notes payable in semi-annual instalments due Nov. 1 and May 1 each year...	51,702.80	
	$336,168.80	
Trust Equipment:		
Inspection and freight charges.	58,510.59	
Total	$398,387.97	
Less:		
Discount allowed by manufac'rs of specialties	55,331.45	
Fiscal year's proportion of interest on leased equipment warrants	51,167.97	
	$106,499.42	291,888.55
Balance to new equipment accounts June 30, 1908.		$9,192,559.95

Statement of Miscellaneous Securities, Carried on Balance Sheet as "Securities of Other Companies," at Cost Value of $11,732,190.35.

	Par value.	Total.
The Colorado Midland Ry. Co. preferred stock (beneficial interest in one-half of $4,954,800, par value)	$2,477,400	
The Colorado Midland Ry. Co. common stock (beneficial interest in one-half of $3,420,200, par value)	1,710,100	
Trinity & Brazos Valley Ry. Co. capital stock.	303,100	
Denver & Interurban R. R. Co. capital stock...	800	
Gilpin R. R. Co. capital stock.	199,950	
Union Depot & Ry. Co., Denver, capital stock.	80,000	
Pueblo Union Depot & R. R. Co. capital stock and sinking fund.	22,520	
Miscellaneous stocks	288,400	
		$5,082,270.00
Bonds:		
Trinity & Brazos Val. Ry. Co. 1st mort. bonds..	$8,760,000	
Denver & Interurban R. R. Co. 1st mort. bonds	903,000	
Other bonds	235,000	
		9,898,000.00
Miscellaneous:		
Trinity & Brazos Val. Ry. Co. certificates of indebtedness		490,083.19
Total		$15,470,353.19

Statement of Capital Liabilities of the Colorado & Southern Lines, June 30, 1908.

	Total.	In hands of public.	Owned or controlled by C. & S. Ry. Co.	Date of maturity.	Interest per annum, per cent.	Interest due semi-annually.
Colorado & Southern Ry. Co. 1st preferred stock.	$8,500,000.00	$8,500,000.00	.....	.....	...	.....
Colorado & Southern Ry. Co. 2d preferred stock.	8,500,000.00	8,500,000.00	.....	.....	...	.....
Colorado & Southern Ry. Co. common stock.	31,000,000.00	31,000,000.00	.....	.....	...	.....
Colorado R. R. Co. stock	101,100.00	500.00	$100,600.00	.....	...	.....
Colo. Springs & Cripple Creek Dist. Ry. Co. pfd. stock	800,000.00	.....	800,000.00	.....	...	.....
Colo. Springs & Cripple Creek Dist. Ry. Co. com. stock	1,200,000.00	900.00	1,199,100.00	.....	...	.....
F. W. & D. C. Ry. Co. stock, incl. $2,539,992 "Stmpd"	9,375,000.00	88,822.00	9,286,178.00	.....	...	.....
Wichita Valley Ry. Co. stock	1,020,000.00	900.00	1,019,100.00	.....	...	.....
Wichita Falls & Oklahoma Ry. Co. stock	23,000.00	900.00	22,100.00	.....	...	.....
Wichita Valley R. R. Co. stock	61,000.00	900.00	60,100.00	.....	...	.....
Abilene & Northern Ry. Co. stock	40,000.00	900.00	39,100.00	.....	...	.....
Fort Worth & Denver Terminal Ry. Co. stock.	15,000.00	900.00	14,100.00	.....	...	.....
Colorado & Southern Ry. Co. 1st mortgage bonds...	19,402,000.00	19,102,000.00	300,000.00	Feb. 1, 1929	4	Feb. and Aug.
Colo. & South. Ry. Co. refund. and exten. mort. bonds	25,110,116.05	18,898,916.67	6,211,199.38	May 1, 1935	4½	May and Nov.
Colorado R. R. Co. 1st mortgage bonds.	348,000.00	.....	348,000.00	Jan. 1, 1938	5	Jan. and July
Colo. Sprgs. & Crip. Creek Dist. Ry. Co. 1st mor. bonds	1,740,000.00	1,740,000.00	.....	Jan. 1, 1930	5	Jan. and July
Colo. Sprgs. & Cripple Creek Dist. Ry. Co. 2d mort. bonds	194,000.00	194,000.00	.....	Apr. 1, 1921	5	Apr. and Oct.
Colorado Springs & Cripple Creek Dist. Ry. Co. 1st consolidated mortgage bonds	1,379,000.00	1,379,000.00	.....	Oct. 1, 1942	5	Apr. and Oct.
Fort Worth & Denver City Ry. Co. 1st mort. bonds...	8,176,000.00	8,171,000.00	5,000.00	Dec. 1, 1921	6	June and Dec.
Wichita Valley Ry. Co. 1st mortgage bonds.	769,000.00	.....	769,000.00	July 1, 1940	5	Jan. and July
Wichita Falls & Oklahoma Ry. Co. 1st mortgage bonds	257,000.00	.....	257,000.00	July 1, 1936	6	Jan. and July
Wichita Valley R. R. Co. 1st mortgage bonds.	744,000.00	.....	744,000.00	July 1, 1936	6	Jan. and July
Abilene & Northern Ry. Co. 1st mortgage bonds.	516,000.00	.....	516,000.00	July 1, 1936	6	Jan. and July
Fort Worth & Denver Ter. Ry. Co. 1st mort. bonds	728,000.00	300,000.00	428,000.00	Dec. 1, 1937	6	June and Dec.
Colorado & Southern Ry. Co. equip. bonds, Series "A"	924,000.00	924,000.00	.....	Apr. 1, 1917	5	Apr. and Oct.
C. & S. Ry. Co. equip. lease, "Pullman," def'd rentals	211,571.50	211,571.50	.....	May 1, 1915	...	.....
C. & S. Ry. Co. equip. lease, "Pullman," notes for interest on deferred rentals.	39,917.60	39,917.60	.....	.....	...	May and Nov.
Fort Worth & Denver City Ry. Co. equipment notes..	159,017.28	.....	159,017.28	.....	6	June and Dec.
Fort Worth & Denver City Ry. Co. equipment lease, Series "A," deferred rentals	468,000.00	468,000.00	.....	June 1, 1914	5	June and Dec.
Fort Worth & Denver City Ry. Co. equipment lease, Series "B," deferred rentals.	340,000.00	340,000.00	.....	Apr. 1, 1917	5	Apr. and Oct.
Fort Worth & Denver City Ry. Co. equipment lease, "Pullman," deferred rentals.	707,011.76	707,011.76	.....	May 1, 1915	...	.....
Fort Worth & Denver City Ry. Co. equipment lease, "Pullman," notes for interest on deferred rentals..	133,393.24	133,393.24	.....	.....	...	May and Nov.
Total	$122,981,127.43	$100,703,532.77	$22,277,594.66			